100 Herbs

for making

JADAM Natural Pesticide

The way to Ultra-Low-Cost agriculture

Geol Yu

Stop spending money on pesticides

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GO ORGANIC AND CUT HUGE,
HUGE COSTS AT THE SAME TIME.

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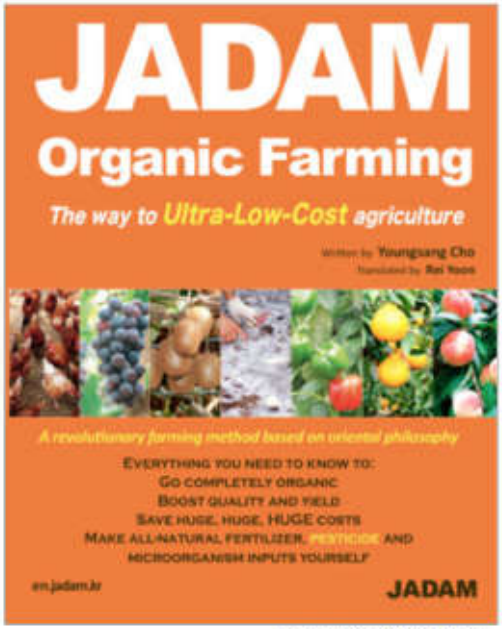
About the author

Geol Yu was born in 1965 in a remote village in the spiritual Horse Ear Mountain in North Jeonla province of Korea. After graduating from Korea University (Statistics) he worked in a financial institution for over 10 years. His journey on foot that crossed the entire White Head Mountain Range inspired him to become a wild herb specialist. He went back to the mountains; to Akyang village in Mount Jiri.

Also a photographer, he spends his time capturing wild herbs and flowers of Mount Jiri while studying and teaching wild plants. He also makes tea from native chrysanthemum.

For years, he has been writing about insect-repelling plants on Jadam website (jadam.kr). His articles and photos can be seen at www.myroad.pe.kr.

He is currently herb specialist and reporter of Jadam, wild herb and flowers teacher at Mount Jiri School, and manager of Gamguk (Chrysanthemum) Tea Garden company.



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Translated by Rei Sungseo Yoon

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Address: 311 Migun 2-B, 187 Techno 2-ro, Yuseonggu, Daejeon, Republic of Korea, 34025
Phone: +82-2-1899-5012
Fax: +82-704667-2955
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JADAM's ultimate objective is to bring farming back to farmers.
Through JADAM's method, farming can become ultra-low-cost, completely organic, and farmers can once again become the masters of farming.
Farmers will possess the knowledge, method and technology of farming.
When organic farming becomes easy, effective and inexpensive, it can finally become a practical alternative.
Farmers, consumers and Mother Nature will all rejoice in this splendid new world we wish to open.

Preface

We have more than 4,500 years of history in organic farming. Organic farming that our ancestors had performed for thousands of years was 'the agriculture with almost no prime cost' in farming materials, because almost everything, ranging from seeds, seedlings, compost, to liquefied fertilizers, was self-sufficient in the farm.

Such self-sufficient farming was feasible because everything required for farming was mostly based on 'something nearby and easily found'. The modern farming, on the contrary, turned into exterior-dependent, energy-intensive agriculture based on 'something far away and hard to get', which has led to a capital-intensive agricultural industry that people never even dream of without sufficient capital.

Such a change into high-cost agricultural structure leads to increase in farming household debts and bankruptcy due to deterioration of agricultural profitability, resulting in a serious problem in national existence of agriculture at this time that the nation is confronting opening of agricultural product import. If our agricultural industry does not overcome the challenges of global competition and energy crisis, it will go into a very difficult phase.

The modern agriculture has established a high-cost structure, mainly because farmers are almost completely dependent on the external inputs, such as microorganism, liquefied fertilizers and pesticides. A fundamental solution would be to make farmers be able to substitute chemical fertilizers and chemical pesticides which are the main culprits in the rising cost of farming.

"JAyeonel-DAMeun-saramdeul (Jadam)" has constantly made efforts to come up with an alternative to help farming families overcome the issue of chemical pesticides and chemical fertilizers. As a result, Jadam has succeeded in developing a method of replacing microorganism and liquefied fertilizers, as well as chemical fertilizers and chemical pesticides. Self-manufacturing technique developed by Jadam is very simple and easy to follow; it

will be help realize ultra-low cost agriculture.

In this regard, Jadam has developed Jadam wetting agent (JWA) which has excellent coating, wetting and penetrating qualities. Jadam has also developed Jadam sulfur (JS) for the first time in the world, a method that dissolves sulfur – which has an outstanding antibacterial and anti-insect function – in water within 10 minutes without heating it. Jadam Sulfur hardly damages the greenhouse vinyl and pipes.

Jadam has chosen a path of sharing the new technologies with farmers, instead of pursuing profit based on monopoly and patent. Therefore, the technology developed by Jadam is becoming a typical self-manufacturing method of natural pesticides for farming families. Jadam's manufacturing methods are laying important foundations for expanding organic organic farming, as they comply with the international organic farming certification standards.

Based on such manufacturing methods, Jadam is actively propagating the idea of 'Ultra Low Cost (ULC)' that only incurs 100 dollars per acre a year and can decrease the cost of agricultural materials to 1/50 of the conventional chemical farming or organic farming. Jadam strongly believes that ULC is the way to save both our farmers and customers.

While studying wild herbs that can be used for natural pesticide, we found that such information was poorly organized. In particular, many of the information provided insufficient photo of the plants so that the user could not readily identify the plants out in the field.

That is why Jadam decided to start organizing data to produce a manual that could help farmers. After making that decision, it took more than 5 years to complete and publish this "100 Wild Herbs for Natural Pesticide." And it is with great sense of relief and satisfaction that the book has finally come to be.

It would have been impossible to publish this book if I didn't meet Geol Yu in Mt. Jiri, an expert in wild plants. I want to express my sincere gratitude to him, the author of this book, for his endless passion. He visited numerous mountains and streams of the country to take relevant pictures and compile data on the wild plants. I believe this book will be an important

milestone in publications in the study of pesticidal plants around the world.

The method of utilizing wild plants for natural pesticides is described in detail in the book titled "Jadam Organic Farming: The Way to Ultra-Low Cost Agriculture". Jadam is holding regular "Natural Pesticide seminars" for those interested in meeting off-line. To use Jadam wetting agent, Jadam sulfur and Jadam herbal solution are opening up a whole new exciting world of natural pesticide that is low-cost, easy, and effective.

The natural pesticide does not belong to the peculiar area of a specific expert anymore. It has become the 'life science' that anyone can access easily to get an answer. The readers of this book will be confident that they can make natural pesticides by themselves. Please visit www.jadam.kr to see the numerous cases of on-site application of this new and exciting method.

I'd like to express my deep respect for Mr. Yu's patience and sincerity in producing this book with us. I also thank you, members and readers, for your continued interest and support.

Youngsang Cho
President
Jadam Organic Farming

Author's Message

Approximately 5,000 kinds of plants grow in Korea. Around 300,000 kinds of plants are known to human beings around the world. Plants began its life 450 million years ago when the green algae came to the shore from water, and since then, it has evolved repeatedly from mosses to pteridophyta and to gymnosperms and finally to angiosperms that propagate by blooming flowers.

As we are well aware, with solar energy as driving force, plants generate organic compounds through photosynthesis for survival. Animals including various microorganism and insects gain such organic compounds by eating or hosting in plants. In return, plants obtain necessary water and mineral from soil with help of microorganism, and accomplish pollination required for reproduction by insects or animals.

From the broad perspectives of cycle of ecosystem, such a process may be inevitable and natural. However, from the perspective of individual plant or species, an attack by microorganism or insects, which are known as disease and pests, is a serious problem that may lead to death or extinction of species. It is more desperate for the plants because they cannot move away from the threat.

Because of this reason, plants have continuously developed and advanced their immune and defense system in the course of evolution in order to protect themselves from threats of microorganism and insects, while choosing to co-exist with them when necessary. One direct example is that plants have created various defensive chemical substances, in addition to other substances required for metabolism, in order to protect themselves from threats of microorganism and insects.

Such organic compounds generate odor or scent to prevent approaches of insects; some paralyze the nervous system or cause digestive problems when the insects eat the plants; some affect the insects' hormones to deter

their molting and breeding; or in the worst case, they cause death of the insects. Some plants, when under attack from a pest, actually "call in" predators.

In this book, 100 plants or wild herbs known to contain defensive substances against such pest insects, have been selected. Their properties, cultivation methods, medical uses and usage in organic agriculture are explained in detail along with pictures. Some notable defensive organic chemical compounds that these wild plants contain include alkaloids, various glycosides (cardiac, HCN, saponin, and bitters) and tannin, pigment compounds such as flavonoid and essential oil.

An alkaloid is a generic term for a basic organic compound containing nitrogen. It mostly has toxicity and even a small amount of the alkaloid can generate a marked medical action on humans and animals. Alkaloid is found in lycorine in red spider lilies/narcissus, aconitine in Aconitum, coniine in Arisaema, phytolaccine in American pokeweeds, ricinine in castor oil plants, nicotine in tobacco, taxine in yew trees, chelidonine & protopine in greater celandines, matrine in sophora roots, vindoline in Madagascar periwinkles, cryptopine in Hylomecon, yerbine in Veratrum, hyoscyamine in Japanese belladonna/datura and caffeine in coffee.

A glycoside is a molecule in which a sugar group is bonded to a non-sugar group. The non-sugar group is known as the aglycone or genin part of the glycoside. The glycoside can be hydrolyzed into the glycone and the aglycone by acid or enzyme glycosidase. Glycosides can be generally classified by properties of the aglycone, the non-sugar group.

Cardiac glycosides that has cardiac compound steroid in its the non-sugar group include digitoxin in digitalis, oleandrin in oleander, and convallatoxin in lily of the valley. HCN glycosides include amygdaline in apricots and ginkgo. Wild plants containing saponin glycosides generating bubble

include Japanese snowbells, Arisaema, water peppers, chinaberry, and Japanese Aralia. Glycosides generating a bitter taste can be found in Picrasma quassioides and tree of heaven.

Wild plants containing sulfur compounds where sulfur belongs to the non-sugar group, such as garlic, onion or mustard, have spicy taste and scent. Wild plants containing volatile essential oil elements with smell and scent include mints, rosemary, lavenders, cinnamon, cloves, mugwort, shiso and heartleaf houttuynias, Chinese Lizards Tails, sweet flag, Japanese rush, Chinese pepper tree, Japanese pepper, hinoki cypress, temple juniper, Korean plum yew and juniper. In addition, most wild plants contain flavonoid, a pigment element, notable of which include garden balsams, knotgrasses, euphorbias, Decumbent Bugles, lilac Daphne, Common Gardenias, Japanese pagoda trees, and firethorns.

Organic compounds effective in inhibiting pest insects mostly have particular properties depending on the family, genus and species. In other words, if a certain species contains a substance effective for pest control, it is highly likely that a similar plant that belongs to the same genus of the aforementioned species has the same substance. If a certain wild plant is effective in suppressing a pest insect, the same effect can be expected from the wild plant that belongs to the same genus of that species.

For example, red spider lilies contain lycorine, a common alkaloid element; the plant that belongs to the genus of red spider lilies and narcissuses also contains the lycorine. In the same manner, an alkaloid called aconitine can be found not only in aconitum but also in other plants that belong to the genus of aconitum such as aconitum pseudolaeve, wolfsbane, aconitum triphyllum and aconitum koreanum. Such idiosyncrasy is closely related to the evolution of the vegetable kingdom. If we take advantage of this peculiarity, we can find more wild plants effective for pest insect con-

trol than the 100 wild plants described in this book.

More research needs to be done to find out how the substances contained in these wild plants affect the pest insects and how these wild plants should be processed to produce more effective natural pesticides. I hope this book serves as a foundation for such future researches. I also hope that this book helps organic farmers who strive amidst many challenges.

Instructions to use wild plants as natural pesticides are briefly described at the end of each introduction of wild plants. However, for a more detailed instructions, refer to the chapter "How to Make Natural Pesticides," in the book "Jadam Organic Farming" written by Youngsang Cho.

Lastly, I'd like to give my sincere gratitude to Youngsang Cho, president of Jadam Organic Farming and Jadam families for their full support in making this publication possible.

Geol Yu

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Digitalis

Dried leaves are used as cardiac stimulants or diuretics. It has a very bitter taste. The leaves contain 30 different kinds of cardiac glycosides including digitoxin, gitoxin, and gitaloxin. Being highly toxic, overdose or long-term ingestion may cause such adverse side effects including nausea, vomiting, arrhythmia, tachycardia and ventricular tremor, and in the worst case, lead to cardiac arrest.

Digitalis (Digitalis purpurea L.) is a perennial plant that belongs to the family Scrophulariaceae. Native and widespread throughout Europe, the plant is commonly cultivated for medical or ornamental purposes. It grows about 1 meter (3.3 feet) tall with an erect stem without sprigs. The entire plant is covered with short glandular hairs. The leaves are ovoid and spirally arranged, and there is a petiole on the leaves located under the stem. The leaves are lined on both sides and have a wave-shaped coarsely serrated margin.

The bell-shaped flowers bloom from May to July. The flowers are arranged from the terminal stem and bloom from bottom to top in order. The flowers are typically reddish purple and the inner side of the flower is heavily spotted. The flower cup is divided into five parts and two of the four stamens are long. The fruits are capsular, ovoid and surrounded by the calyx. The leaves are similar to those of a comfrey, but the former is considerably bitter.

Cultivation

The plant grows easily in well-drained sandy loam in full sun. It doesn't grow well in shade. Propagation is made by seeds. Seeds are sown in spring or autumn. In colder regions (*central-to-northern regions in Korea), it is advised to cover the seeds with thick bundles of straw for sowing in autumn. For fall seeding, it is best to sow the seeds between late August and early November. For spring sowing, late March is the best time.

The seeds are small so mix them with sand before scattering, cover them up with shallow soil, and spread the bundle of straw over them. The seeds usually germinate in 3 weeks after sowing. If directly sowed, thin the plants so that each stand 20 centimeters (8 inches) apart. In case of transplanting, move the plant from the pot to the garden when the root leaves grow to the length of a finger. The leaves grow out as a group from the root in the first year and then from the stem from the second year.

Medical Uses

As herbal medicine, the dried leaves are used as cardiac stimulants or diuretics. It has a very bitter taste. The leaves contain 30 kinds of cardiac glycosides

which belong to the steroidal saponin, including digitoxin, gitoxin and gitaloxin. Recently, gitostin and glucodigiqlucoside have been segregated. It is mainly used in the treatment of cardiac insufficiency.

Being highly toxic, overdose or long-term ingestion may cause adverse side effects such as nausea, vomiting, arrhythmia, tachycardia and ventricular tremor, and in the worst case, cardiac arrest. The estimated lethal dose of digitoxin is known to be 5 mg per 1 kg of body weight. Digitalis glycosides may be easily accumulated in the body as its process of absorption and decomposition is slower than that of strophanthin, lilies of the valley, or Adonis plants. In the past, incorrect dose caused many cases of death. Nowadays, the adverse side effects have decreased considerably as the dosage is adjusted based on the measured concentration in blood and the combined use of diuretic.

In the "Constituents and Medical Uses of Herbs" is written, "Digitalis acts on central and peripheral nerves, kidney, intestine, and central nerve system, but it mainly affects circulation of heart blood and urination.

Cardiac glycosides of the digitalis selectively act on the heart to strengthen and shorten its contraction, while lengthening the dilation period. In addition,

it increases the heart rate and the amount of blood pumped out in one minute, slows down the heart's rhythm, improves the metabolic process, and thereby benefits the nutrition of the cardiac muscle.

Microelements included in the leaves, such as copper and manganese, remarkably increase biological activity of cardiac glycosides. Compared to other cardiac glycoside medicines in the form of powders, infusions or extracts, the plant has better treatment effects and lesser side effects which is largely associated with these microelements. Biological activity of cardiac glycosides drastically increases when the microelement is present. Proper input of copper and manganese during cultivation promotes the biosynthesis of cardiac glycosides. It also strengthens biological activity while reducing toxicity.

The plant is used in the treatment of valvular heart disease, hypertension, and 2nd and 3rd stage of chronic cardiac de-compensation caused by other diseases. It is also effective for the treatment of palpitation caused by ventricular fibrillation. It is effective against swellings and shortness of breath. It reduces stasis, normalizes pulse, speeds up the blood flow, increases urination, and improves general health conditions. However, overdose may cause extremely slow pulsation, shortness of breath, unpleasant feeling around the heart, and inability to sleep well."

This highly toxic plant can be used in organic farming as a natural pesticide. Extract fresh juice from the plant, boil the dried plant in water, or infuse it in alcohol.

Red Spider Lily (Hurricane Lily)

The bulbs are used as medicine. Its effects include loosening phlegm, diuresis, treatment of edema, ascites and triggering vomiting. It is used in treating coughing, sputum, lymphadenopathy and various kinds of boils.

Red spider lily (Lycoris radiate Herb.) is a perennial plant that belongs to the family Amaryllidaceae. Originally from the Yangtze River area, China, it is widely cultivated in Korea, Japan, and many East Asian countries for ornamental purposes. The chives-looking leaves are parallel-sided with a paler central stripe: 30 to 40 cm (12-16 in) long and 1.5 cm (0.6 in) wide, the leaves grow out from the bulb as a group, after the flowers fall off in autumn. The leaves go through winter, grow, and then wither in May. The bulbs are wide-oval shaped with diameter of 2.5 to 3.5 cm (1-1.4 in) with a black outer skin.

It normally flowers before the leaves fully appear in September or October, on 30 to 50 cm (12-20 in)-long stems where 4 to 5 red flowers are arranged in

umbels. Six petals look like an upside-down lancet and are curled up backward with wave-shaped lines at the margin. Six stamens and one pistil are all red and elongated out of the flowers. Most of cultivated red spider lilies are triploid forms and are sterile.

Cultivation

Red spider lilies grow well in half-shaded, relatively damp places. However, due to their strong survivability, it is quite easy to grow them mostly anywhere. Propagation is made by the bulbs. While avoiding the blooming period, divide the head of the bulbs for planting mostly after the leaves fall off, or cut the bulbs into pieces for planting. Water it so that the surface of the soil does not dry out.

If potting the plant, use a big pot if possible. It is recommended to dig out the bulbs after the leaves dry out, about once in three years, to divide the head because if the root is tangled inside the pot, the plant does not grow healthy. When the plant is cultivated in a garden or a field, it is not necessary to dig out the bulbs for several years. If the leaves grow slowly in the time that they should appear after the flowers fall off, it is recommended to apply a small amount of

nitrogen-based fertilizer. Poor growth of leaves may lead to poor blooming in the following year.

Medical Uses

The bulbs are used as medicine. Dig out the bulb when the leaves fall off and rinse it thoroughly. Cut it into small pieces and dry under the sun or use it fresh. The plant acts on loosening phlegm, diuresis, treatment of edema, ascites, and triggering vomiting. It is also used to treat coughing, sputum, lymphadenopathy and various kinds of boils. Decoct about 0.5 to 3 g of dried plant and ingest. Apply the pounded raw root to the boil or wash the affected area with the plant decocted water. Because of strong toxicity, only a small dose should be taken and fresh juice should never be taken. Overdose may cause vomiting, diarrhea, respiratory failure, convulsion or central nerve paralysis, and in the worst case, death.

Poison of Licorice radiate dissolves well in water. In the past in the year of

bad harvest, people used to tear off the bulb, wash out the poison with water and use it for food. 20% of the bulb is starch. Some people died because they did not get rid of the poison from the bulb. If you add the dried bulb powder into glue or pigment, you can protect the painting from insects or discoloration for a long time.

Major toxic components are alkaloid elements including lycorine, tazettine, lycoramine, lycorenine, homolycorine, and calarthamine.

The lethal dose of lycorine is known to be about 10 g. The toxic components are found in highest concentration when the leaves fall off, because that is when the bulbs contain the most nutrients. If you plant the bulbs, it is said to help fend off moles and snakes.

In organic agriculture, the lycorice bulb can be used as a natural pesticide. Extract juice from the bulb, or decoct it with boiling water, or infuse it in alcohol for use. It can chase away moles.

Aconitum

It is called “Cho-oh” (crow plant) or “Oh-du” (crow head) because the shape of the underground tuber resembles the head of a crow. The scion root of Oh-du is called “Bu-ja” (prepared aconite). With its strong toxicity, it was used to make King’s Poison, which the kings gave to rivals or adversaries to kill them. It was also used to taint the arrow or spear tips for hunting.

Aconitum (Aconitum jaluense Kom.) is a perennial plant that belongs to the family Ranunculaceae and it mostly grows to 1 m (3.3 ft) tall around mountain valleys. Many similar species belong to the genus of Aconitum, including A. ciliare, A. chiisanense, A. seoulense, A. triphyllum and A. uchiyamai. The leaves grow out from the tuber diagonally. The palm-shaped leaves have an alternate arrangement, 3-to-5-lobed deeply. Each leaflet is divided again and it has a long petiole.

Around September, the tall, erect stem is crowned by recemes of purple

flowers. The small flower stem and flower cup is covered with fine hairs. One of the petaloid sepals is surrounding the pistils in the form of a cylindrical helmet. Two snail-head-shaped petals are placed under the hood of calyx and are supported on long stalks. The plant has a lot of stamens and 3 to 4 pistils. The fruit is an aggregate of follicles and three fruits are attached together. The oval-shaped fruit ripens in October.

Cultivation

The plant mostly grows in the shady and moist of valley in the northward slanting area. It doesn't like dry place under the sun. Avoid direct sunlight in summer and keep moisture in the soil. In case of potting, divide the tuber every other year. It is easily propagated by division of the tuber or by seeds.

Sow seeds in October right after collecting them, or in the next spring. For division of tubers, use the lateral root and the root divided from the lateral root. Pick the root with sound germ without scratches for planting. Direct the germ upward when planting. Plant deeply in autumn to protect the germ from freezing and 3 to 5 cm (1.2-2 in) deep in spring.

If you remove the flowers when the buds appear in the late August to early September, you will get a stronger tuber. Harvest is possible when the flowers start blooming from late September to mid-October or when the flowers have completely bloomed. After harvest, cut the stem close to the tuber. Separate the main root and the lateral roots and remove the fine roots and rinse them with water before drying in the sun.

Medical Uses

It is called "Cho-oh" (crow plant) or "Oh-du" (crow head) because the shape of the underground tuber resembles the head of a crow. The scion root of Oh-du is called "Bu-ja" (prepared aconite). With its strong toxicity, it was used to make King's Poison, which the kings gave to rivals or adversaries to kill them. It was also used to taint the arrow or spear tips for hunting.

Cho-oh tastes so spicy and bitter that it can paralyze the tongue. It has much "heat energy" and is very poisonous. In traditional medicine, it is decocted repeatedly in salt water or steamed to alleviate toxicity before making into medicine. It is used in the treatment of paralysis caused by wind and moisture, unconsciousness, rheumatoid arthritis, neuralgia, low back pain and tetanus. It can be used for abdominal pains caused by cold stomach. Its pharmacological actions include pain-killing, tranquilizing and anti-inflammatory effects, as well as alleviation of local paralysis.

Major toxic components are alkaloids such as aconitine, mesaconitine, and hypaconitine, which are very strong cardio and neurotoxic poison. The toxic components are contained not only in the tuber but in the entire plant body. The content of toxic alkaloids in Cho-oh increases when baby root comes out from mother tuber in June to July and grows until autumn.

Taken a correct dose, Cho-oh can increase energy, warm the internal organs, and make the stomach, intestine, liver and kidney healthy, but an overdose may cause poisoning accidents, that may lead to death. When poisoning happens, first there are slower pulse, blood pressure drop, and vomiting. Then 1 to 2 hours later, the body begins to become paralyzed. Paralyzing starts from the inside of mouth, hands, and feet, and reaches the heart and the myelencephalon, causing respiration failure and unconsciousness.

The lethal dose of aconitine is 3 to 4 mg. The estimated minimum fatal dose of the plant is known to be 1 g. In particular, just 1 g of the Aconitum root will cause death. In case of poisoning by Cho-oh, take the thickly-decocted black bean or licorice or decocted Japanese lady bell root or Similax root. If it is hard to get the black bean or the licorice, thickly boiled brown sugar may work.

In organic farming, the Aconitum tuber or the entire plant can be used as a natural pesticide. Extract juice from the entire plant, decoct it with boiling water or infuse it in alcohol for use.

Oleander

Usually planted by the road or in gardens. Due to its toxicity, it was called “fence of death.” The entire plant part is toxic, but the stems, leaves, and flowers are used as cardiac stimulants and diuretics in the traditional medicine.

Oleander (Nerium oleander L.) is an evergreen shrub in the family Apocynaceae. It is native to India and the Persian regions. In the southern warm regions, it is used as a street plant or a garden plant. The plant is also called “Yudohwa” (willow peach blossom) as the leaves look like a willow and the flowers resemble peach blossom.

It grows to 3 m (10 ft) tall, with erect stems that splay outward. The bark of

the plant is dark brown and the leaves are in whorls of three, narrow lanceolate, thick and no hairs on both sides with flat margin. The flowers bloom in July to August but flowers persist until fall. Depending on the variety, the flowers are red, white, magenta or white yellow, usually 3 to 4 cm (1.2-1.6 in) in diameter, with a deeply 5-lobed fringed corolla around the central corolla tube. There are 5 stamens and the fruit is dehisced and composed of several ovaries. The fruit grows to 10 cm (4 in) in length and splits open at maturity and the seed is densely covered with light brown hairs.

Cultivation

Oleander grows well in warm places in full sun. It is resistant against pollution and salinity. It is fast-growing. However, it doesn't cope well with cold. It can only be left outside in warm southern regions during winter. In the central regions, it should be grown in greenhouses or as indoor plants. Propagation is mostly made by cutting.

For cutting, in spring before new sprout comes out, cut the stem grown in the previous year by 10 to 15 cm (4-6 in) and plant it. Or cut unbloomed stem in July to August and plant. Before planting, put the stem in water to promote rooting. For transplanting, take a wide area for planting as the head grows bigger. When it

grows too big, cut the stem short from the root-side and start a new stem.

Medical Uses

The Oleander flower was used in funeral in the ancient Greece and Italy. It was presented before the Buddha or used to cover the face of dead people in India. Usually planted by the road or in gardens. Due to its toxicity, it was called "fence of death." The entire plant part is toxic, but the stems, leaves, and flowers are used as cardiac stimulants and diuretics in the traditional medicine.

According to "Dictionary of Chinese Medicines," it is said that "Oleander has a bitter taste, cold properties, and toxicity. It incurs cardiac stimulation and diuretic effects. It is effective in decreasing sputum, stopping asthma, relieving pains and removing extravasated blood. It is used in the treatment of swellings and terrible aches caused by cardiac insufficiency, asthma, epilepsy and bruises, as well as menopause."

White succus comes out when the stem is cut. If the succus contacts wounded skin and is absorbed, it can be dangerous. It is so toxic that there are number of death reports from eating from chopsticks cut from oleanders. The fresh bark has stronger toxicity than the leaves and toxicity decreases after dry-

ing-up. The toxic components in the leaves are found in highest concentrations in blooming period, and the aged leaves have higher toxicity than the younger ones.

One of the major toxic components contained in Oleander is oleandrin, a cardiac glycoside composed of oleandrigenin and oleanedrose. Other toxic components include neriantin, adynerin, digitoxigenin, gitoxigenin, and uzarigenin. Major symptoms of poisoning are diarrhea, vomiting, dizziness, abdominal pain, and cold sweat. In the worst case, pulse becomes irregular and cardiac arrest results, finally leading to death. Lethal dose for animals is known to be 0.30 mg per 1 kg of body weight, which corresponds to 18 mg for a 60 kg person.

This high toxicity can be used in organic farming to turn it into natural pesticide. Fresh juice, or decoction in water, or extraction in alcohol are some available methods. It can also be used as a fumigant in greenhouses by burning as toxicity is still present in smoke.

Arisaema

When it touches the mouth, a drunken sensation appears, along with sleepiness, vomiting, and drop in blood pressure, followed by respiration failure and cardiac arrest.

Arisaema (Arisaema amurense f. serratum) is a perennial plant growing under trees or in shady and damp areas in mountains. It grow to 15 to 50 cm (6-20 in) tall. The main tuber is shaped like a flat ball. 2 to 3 small tubers are attached to the main tuber and fibrous roots spread around from the upper area of the tubers. The circular-cylinder-shaped stem is green outside but is spotted in purple sometimes. The leaves are lobed into 5 to 11 leaflets. They are lanceolate, ovoid and have spiky margin.

The plant produces unisexual dioecious flowers in May to July. The funnel-

shaped bracts are green and the top of the bracts are bent forward like an arrow. In some varieties, the top of the peduncle is developed into a form of club or cane. The plant produces densely-packed berries that ripen in red in October.

Other than Arisaema amurense, similar plants are found in Korea including A. peninsula, A. heterophyllum, A. ringens, and A. thunbergii.

Cultivation

The plant is easily grown in humus-rich soil with high moisture in partially-shady or shady environment. The root only grows in spring and thus sufficient fertilizers are recommended during growth period. If the root is dry, the leaves turn yellow and sleek and fall off in the end. Propagation is made by tubers or seeds.

Lots of small tubers are produced around the mother tuber if the soil is fertile. Separate and plant these small tubers in September or October. The plant also easily propagates by seed. Collect the ripened seeds and plant them directly

in autumn, or store the seeds underground to keep them from drying and then sow them next spring for germination.

Medical Uses

The plant is commonly cultivated for ornamental purposes or, after neutralizing the toxicity, used for pain-killing, loosening phlegm, and anti-convulsion. In autumn, dig out the tubers and remove the fine roots. Peel out the skin after washing the tubers in water and cut them into pieces before drying in sun.

The "Dictionary of Oriental Medicines" explains "The plant has bitter and spicy taste and warm properties. It acts on lung, spleen, and liver meridians. It eliminates dampness in the body, decreases sputum, stops convulsion, and removes extravasated blood. It is used in the treatment of hemiplegia with crooked mouth and eyes caused by stroke, epilepsy, children's fit, tetanus, dizziness by wind-caused cramps, arthralgia, coughing with sputum, boils, tuberculous cervical lymphadenitis, and extravasated blood caused by bruises. It is also used in the treatment of acute and chronic bronchitis.

Toxicity must be neutralized before using for internal medicine. Boil the plant with ginger extract or alum water until the plant is fully cooked to the inside and dry it. Take 3 to 6 g (neutralized) a day in the form of herbal infu-

sion, powders or pills. For external uses, pound the plant and apply it to the affected area or mix the plant powder with the ointment base."

The tubers in the genus of arisaema contain triterpenoidal saponin, benzoic acid, starch, and amino acid. The fruits contain fatally toxic alkaloid elements like coniine.

The entire plant is poisonous but the tuber is particularly strong in toxicity. When it touches the mouth, a drunken sensation appears, along with sleepiness, vomiting, and drop in blood pressure, followed by respiration failure and cardiac arrest.

Organic farming can use this property to make natural pesticide. Extract juice from the entire plant including the tuber, decoct it with water, or infuse it in alcohol for use.

American Pokeweed

Fresh juice extract from the root is used to catch fish. Infuse the leaves in water for a sufficient time to eat them as vegetables. Decocted root water is also used to make "Sikhye," a Korean traditional rice drink.

American pokeweed (Phytolacca americana L.) is a perennial plant in the family Phytolaccaceae, native to North America. It is a naturalized plant, assumed to have been introduced into Korean around the 1950s; it is now commonly found everywhere in the country. It grows to 1 to 1.5 m (3.3-5 ft) in height. The stem is reddish purple, and divided into twigs at the top. The long-oval-shaped leaves are alternate and grow 10 to 30 cm (4-12 in) in length.

The reddish-white flowers bloom from June to September in an upright or drooping receme. There are 10 filaments and styles, respectively. A dark-reddish

purple berry, 3 mm in diameter, is produced. The calyxes are remained and inside are 10 black seeds. It likes acid soil; and its fruit and roots are also acidic which further acidifies soil. Being extremely prolific, it threatens Korea's native eco-system.

Cultivation

It is a very strong plant that it can grow even in a small crack on the road. It can be easily cultivated anywhere. It readily survives drought. It likes full sun. It is easy to find as it is everywhere. Cultivation is made by transplanting the wild plant, performing cutting or planting seeds.

For transplantation, take the plant in spring when the new sprouts have just appeared. In spring, the plant is not deep-rooted, and thus, the root can be easily seated after transplantation because it is still in growth period. For seeds, collect well-ripened seeds in autumn for planting. The root grows big in 2 to 3 years. The root can be easily established through cutting too. Cut the stem in

10 cm (4 in) length and plant it from spring to summer.

Medical Uses

Fresh juice extract from the root is used to catch fish. Infuse the leaves in water for a sufficient time to eat them as vegetables. Decocted root water is also used to make "Sikhye," a Korean traditional rice drink. In oriental medicine, pokeweed is called "Sangryuk" which is used in the treatment of nephritis as such diuretics, and swellings and ascites caused by portal cirrhosis. In addition, the root decocted in water is used for emetics, insecticides, and purgatives.

"Grand Dictionary of Chinese Medicine" describes the plant as follows: "The plant has a bitter taste, cold properties, and toxicity. Rinse the plant thoroughly with water, submerge and leave for a long time so that it becomes fully soaked, slice into pieces, and then dry in the sun. It acts on spleen, large, and small intestine meridians. It facilitates urination and bowel movement and is used in the treatment of edema, ascites, peritonitis, beriberi, throat pain, small furuncles and serious boils."

In the past, pokeweed was used as emetics or a medicine to treat rheumatism in the West, but it is not currently used widely because of its strong toxicity that outweighs its medical benefits. People should take full caution in using this plant. The entire plant part is toxic but the root and the well-ripened fruit in particular contain high level of toxic components including phytolaccine, saphonin and a large amount of potassium nitrate.

Major poisoning symptoms include hives, vomiting, and diarrhea. In the worst case, pulsation slows down and blood pressure drops seriously, leading to cardiac arrest. However, its toxicity is not as strong as that of Aconitum. Children or senior people with poor health conditions or diseases might not be so, but for an average adult, death would not result unless one ingests a very large amount.

Its toxicity can be used in organic farming. The whole plant can be blended to produce fresh juice. It may also be decocted or infused in alcohol.

Castor Oil Plant

Castor oil is produced from the seed. Ricin contained in the seed is one of the strongest toxic components among naturally occurring substances.

Ricinus communis, also commonly known as Castor Oil plant, is native to India, Asia Minor and North Africa and is widely cultivated throughout tropical regions. It belongs to the family Euphorbiaceae. In its native regions, the plant grows tall and thick like a tree. However, it is an annual plant in Korea because it dies in cold winter.

At maturity, the plant can reach more than 2 m (6.7 ft) in height. The stem becomes branched like a tree. The leaves are long-stalked, alternate, palmate, 5 to 11-lobed, and with a sharply serrated acute margin.

In August to September, the floral stalk about 20 cm (8 in) in length appears at the end of the stem, and the male flowers and the female flowers are borne in receme. The male flowers are arranged on the lower area of the stem, with finely divided filaments and yellow anthers. The female flowers are

borne on the higher area of the stem with 5-lobed red petals.

After pollination, the plant produces a spiny round fruit, 2 cm (0.8 in) in length. When the fruit is ripe, it is divided into three parts in which each part contains one seed, respectively. The oval, bean-like seed has various brownish mottling.

Cultivation

The plant can be easily grown throughout the country (Korea). Sowing is recommended in the middle to late part of April. Appropriate temperature for germination is 25 to 35°C (77-95°F). The plant can reach a height of 2 m (7 ft) or more, but if you prefer a smaller size, delay the sowing period.

Pre-soak the seeds in water overnight, then plant 3 to 4 seeds in one hole with each hole with the distance of 60 cm (24 in). When the new sprouts appear, leave only one best sprout and pick out the rest. Plant in full sun and avoid drying up.

Medical Uses

Castor seed is the source of castor oil. The seeds contain 40 to 50% fatty oil, and the press cake after fatty oil has been squeezed out contains ricin, ricinine, lipase, etc. 89% of the fatty oil consists of ricinoleic acid and the rest includes palmitic acid, stearic acid, and linoleic acid. The fatty oil is the main ingredient that causes diarrhea by being broken down in the duodenum.

"Dictionary of Oriental Medicines" describes Castor Oil Plant as below: "Pluck the fruits when the seeds are ripe in autumn, peel the skin, and dry it in the sun. It has a sweet and spicy taste, plain properties, and toxicity. It acts on liver and spleen meridians. It reduces swellings, removes pus, and neutralizes poison. Peel the skin from seeds and grind them, mix them with honey, and apply to furuncles and tuberculous cervical lymphadenitis. The boiled castor oil can be used as purgatives. Take 15 to 30 ml per dose. The leaves are used to treat beriberi, swelling and painful scrotum, and coughing with sputum. The root is used to treat tetanus, epilepsy, tuberculous cervical lymphadenitis, and diseases caused by wind and moisture."

The plant is also used in the treatment of facial nerve palsy

and hemiplegia caused by stroke. However, it should never be used by people with a weak stomach or large intestine, diarrhea patients, and pregnant women.

Ricin contained in the seed is one of the strongest toxic components among naturally occurring substances. Ricin is considered one of major bio-chemical weapons along with Bacillus anthracis and Clostridium tetani, and has been used historically during World War I and II. In 1978, a dissident of Bulgaria, while waiting for a bus in London, was poked by the sharp end of the umbrella tainted with ricin, and killed.

If a significant amount of ricin is inhaled or penetrated into blood, pulmonary/gastric hemorrhage occurs, leading to death within 72 hours. The lethal dose of ricin for adults is known to be 0.16 g. The entire plant part including the leaves and seeds contain ricin, but the seeds in particular have high concentrations. Both ricin and ricinine have very strong toxicity, but they are heat-intolerant. The young leaves are edible after blanching them in boiling water.

Toxicity of castor oil plant can be used as a natural pesticide in organic farming. Extract juice from the leaves or the unripe fruits or infuse them in water or alcohol for use. You can infuse the press cake in water that is left after squeezing oil.

Tobacco

Nicotine is a toxic component that can cause agitation, paralysis, and convulsion by irritating the nervous system in case of overdose, leading to death in the worst case. However, a small amount of nicotine consumed by way of smoking may give a pleasant feeling by stimulating the nerves and helps overcome fatigue.

Tobacco (Nicotiana tabacum) is an annual plant in the family Solanaceae, native to subtropical regions. The plant is widespread up to the northern temperate regions, as it has a short growth period and easily adapts to various cli-

mates. In Korea, it was introduced in 17th century. The erect stalk grows up to 1.5 to 2 m (5-6.7 ft). The leaves are alternate, 50 cm (20 in) in length, oblong-elliptic, acuminate at the apex, and flat at the margin. The short petioles have wings and they are decurrent at the base.

The flowers are borne in panicles in July to August at the apex of the stalk. The corolla is shaped like a tube. The light-red upper area is 5-lobed. 5 stamens are not exposed or slightly exposed outward. The fruits are capsular, ovoid, and surrounded by the calyx. 2,000 to 3,000 seeds are found per fruit and the seeds are very small, light, ovoid and dark brown.

Cultivation

Temperatures of 25 to 28°C (77-82°F) are best for sprouting and growing. Plant the seed on hotbed and grow seeding. Sow the seeds in early March, 60 days before transplantation. Cover the seeds with rich and fine soil after sowing. When 4 to 5 leaves appear after sowing, transplant the seeding into a vinyl pot. Grow the seeding in the pot until the number of leaves reach 9 to 10, and then transplant to the field.

Unlike other crops, the leaves of tobacco, not the fruits, are harvested. When the stalk grows, cut the shoot-top to prevent the nutrients being concen-

trated into the flowers.

About 20 leaves are arranged on one stalk. When the leaves begin losing color, harvest and dry the leaves. In the drying process, the color of leaves gradually turn from green to yellow to brown. In the process, insoluble high molecular compounds are decomposed into soluble low molecular compounds.

Medical Uses

When tobacco was first introduced in Korea, it was also used as a medicine. It was used in the treatment of insect bites, abdominal pains caused by parasites, toothaches, and hemostasis of the injured area. It was also used as anti-suppuration agent. In particular, tobacco was known to effectively remove sputum; hence the name "Dampagwe (sputum removal)" which over time changed to "Dambi" and then finally to the current name of "Dambae."

Tobacco has approximately 10 kinds of alkaloids: nicotine accounts for 95% of them, nornicotine and a trace of anabasine are also found. Nicotine is

produced from the meristem of the root and moves upward through the vessel. More upper leaves contains more nicotine. Topping will develop the rootlet, thereby increasing synthesis of nicotine.

Nicotine is a toxic component that can cause agitation, paralysis, and convulsion by irritating the nervous system in case of overdose, leading to death in the worst case. The lethal dose of nicotine is known to be 30 to 100mg. The nicotine content in a cigarette currently sold in Korea is about 1 mg. A small amount of nicotine consumed by way of smoking may give a pleasant feeling by stimulating the nerves and helps overcome fatigue. It calms nervous feelings and wakes up a woozy brain.

Due to its toxicity, tobacco can be used as natural insecticide or fumigant in organic farming. If you grew tobacco plants, use the leaves. If not, collect cigarette butts, decoct in water or infuse in alcohol.

Lacquer Tree

When the stalk of Lacquer Tree has a cut, toxic milky sap is discharged. The sap works on protecting the plant from attacks of insects or animals and healing the tree's wound. The sap collected from the stalk is called fresh lacquer, and the sap dried and hardened is called dry lacquer.

Lacquer Tree (Rhus verniciflua Stokes) is a deciduous tall tree growing to 10 to 20 m (33-66 ft) in the family Anacardiaceae, native to China. The tree is mostly cultivated by people and there are some that have gone feral.

The leaves alternate and consist of 9 to 11 leaflets in pinnate compound. The leaflets are ovoid or elliptical, acute at the apex and flat at the margin. The yellowish green flower is borne in May in panicle. The light-yellow, bean-sized, round, and flat fruits are produced sparingly in September or October.

In Korea, The true lacquer tree has been cultivated since long ago to use for varnishing furniture and for medical purposes. Chinese Sumac, Japanese Sumac, Rhus sylvestris and Rhus succedanea are also easily found in mountains. Among them, the true lacquer tree

is the strongest in toxicity. Japanese sumac has wings on the petiole, with a coarsely serrated margin.

Chinese Sumac has more than 13 leaflets in general and the young stalk is more reddish than lacquer tree. The fruits of Chinese Sumac are covered with thick hairs, unlike lacquer tree. Most lacquer trees in the wild are Chinese Sumac.

Cultivation

Lacquer tree can be grown throughout the country (Korea) but the preferred habitat is the place with full sun and without harsh winter wind in the foot of mountains or relatively steep fields. Propagation is made by seeds or root cutting. For seeding, collect the seeds from the trees with abundant lacquer sap in late October. The seed is very hard and so does not germinate easily. Remove the pericarp and treat it with sulfuric acid at low temperature to facilitate germination. It is easier to purchase and plant saplings if the cultivation area is small.

When the tree grows up, prune it to grow an erect stem up to 2 m (6.6 ft) in height. Collect the sap when the diameter of the tree reaches around 10 cm (4 in) after about 6 years after planting the seedling. The sap is collected by making a cut on the stalk or by cutting down the tree; the latter is more frequently used. It is possible to collect sap from mid-June, but the best period is 60 days after the monsoon rain in Korea (from July 10 to September

10). Noon of a clear day is the best time to collect the sap.

Medical Uses

When the stalk of Lacquer Tree has a cut, toxic milky sap is discharged. The sap works on protecting the plant from attacks of insects or animals and healing the tree's wound. The sap collected from the stalk is called fresh lacquer, and the sap dried and hardened is called dry lacquer.

Major ingredient of the fresh lacquer is urushiol (66-72%), gum (4-8%), nitrogen substance (2-3%), and water (11-16%). Urushiol is a phenolic compound, a viscous liquid with no color, but it is oxidized and coagulated in black in air.

The sap of the lacquer tree has high hardness and beautiful gloss and it doesn't change after a long period, withstands acid, alkali or heat over 70°C (158°F). Due to such properties, it is mainly used as a luxurious traditional coating agent or varnish in special fields. It is also used as medicine or a food in-

gredient in "Otdak" (chicken soup with lacquer).

According to "Donguibogam (Eastern Medicinal Manual)," the dried sap of the lacquer tree: "…has a spicy taste and warm properties with toxicity. It reduces extravasated blood and cures after afterbirth pains. It eliminates roundworm by stimulating the small intestine. It relieves hardness in abdominal areas, treats cerebral anemia, and kills 3 kinds of parasites. It is also used in the treatment of contagious tuberculosis."

Ilhun Kim, the founder of Insan Bamboo Salts, said, "the sap of the lacquer tree is used to treat all kinds of stomach disorder by warming the stomach, eliminating inflammations and helping digestion. It also acts on the liver to treat extravasated blood and control inflammations. It acts on the heart as a blood-cleaning agent and controls all kinds of heart diseases. It also eliminates tubercle bacillus from the lung, acting as an antibacterial agent and treats all kinds of kidney disease, working as diuretics. The sap of the lacquer tree does not only treat several diseases in internal organs but it also is used as an excellent medicine in the treatment of neuralgia, arthritis, and skin diseases."

Organic farming can use toxicity of lacquer tree as natural pesticide. Decoct in water or infuse in alcohol. You can also burn it and fumigate greenhouses.

Yew Tree

People sometimes eat the fruit flesh surrounding the seed, as it has a sweet taste and attractive color. It is fine to eat the flesh, but the seed can cause poisoning.

Yew Tree (Taxus cuspidata Siebold & Zucc.) is an evergreen tall tree in the family Taxaceae that grows in alpine regions. At maturity, it grows up to 20 m (66 ft) in height and 2 m (6.6 ft) in diameter, and it is widespread in Korea, Japan, northeast China and Siberia. The arm and main stem of the tree is reddish brown; its bark is thinly peeled in the form of shavings. The leaves are lanceolate and arranged spirally on the stem or in two rows like a feather. The dark green leaves are 1.5 to 2.5 cm (0.6-1 in) long and 2 to 3 mm (0.08-0.12 in) wide, and have a yellowish green line (stoma) on the back which is a

breathing pathway.

The flower is borne in April. The male flower and the female flower bloom separately on the leaf axil. The male flower is brown and surrounded by 6 scaly leaves and has 8 to 10 stamens and 8 anthers. The female flower is green, ovoid, blooms in 1 or 2, and is surrounded by 10 scaly leaves. In September of October, the seeds surrounded by red fruit flesh are produced and a part of the seed is exposed outwards.

Cultivation

Its main habitat is alpine regions (such as Mt. Sobaek, Mt. Deogyu and Mt. Taebaek in case of Korea), but it was developed as ornamental tree and planted in parks, apartment complexes or private gardens. It grows slow but has excellent budding capacity. Therefore, it is easy to create fencing by trimming or pruning the trees and design the trees into triangle or circular cone shapes.

Propagation is made by seeds or cutting. Collect the seeds in September

to October. Sow the seeds right away after peeling the skin. Or store the seeds in sand and sow them in the next spring. For cutting, cut a 2 to 3 year-old stalk by 10 to 15 cm (4-6 in) in length in the middle of April to early May, and then plant.

Medical Uses

In folk medicine, yew tree is used to treat dysmenorrhea and diabetes. In Europe, the seed was used in the treatment of diarrhea and cough, and the leaves were used as anthelmintic. In 1967, taxol extracted from the yew tree was known to the public as an effective anti-cancer agent that inhibited ovarian cancer, various boils, and leukemia. Korea developed a way to mass produce taxol and had gained international attention.

However, the yew tree has a strong toxic called taxine which is an alkaloid. The term "toxin" in English is said to have originated from taxine. Taxine is mostly contained in the seeds and the leaves. Lethal dose is known to be 0.25 g for a person weighing 50 kg (110 lb).

In "Hamlet," one of very famous plays by Shakespeare, the younger brother of the king poured a bottle of poison to the king's ear when the king was taking a nap. It is said that that poison was obtained from the seeds of European yew tree.

According to "Constituents and Medical Uses of Herbs," it is stated that "Taxine contained in the yew tree decreases blood

pressure and slows down the heart movement, leading to diastolic stoppage in case of overdose. It does not affect respiration but it does when heart function is weak. The cause of death from overdosing taxine is cardiac arrest. Taxine also causes gastroenteritis. However, in a small dosage, taxine is effective for cardiac stimulation. In a folk remedy, the stalk or the bark of the tree is used in the treatment of coughing and neuralgia."

People sometimes eat the fruit flesh surrounding the seed, as it has a sweet taste and attractive color. It is fine to eat the flesh, but the seed can cause poisoning. In fact, in plant poisoning accidents in the U.S., yew tree always ranks high in the list.

In organic farming, toxicity of yew tree can be used as a natural pesticide. Extract fresh juice from the entire plant, decoct it with water, or infuse it in alcohol for use.

Ginkgo

Ginkgo seeds are beneficial if you take a small amount for a long time or a proper amount as medicine depending on symptoms. However, it is not recommended to take the ginkgo seeds raw or in large amount at once.

Ginkgo (Ginkgo biloba L.) is known to have been the most prosperous in the Mesozonic Era 250 million years ago. It grows up to 40 to 60 m (130-200 ft) at maturity. The branches are erect and the barks are gray. The leaves are fan-shaped with thinly bifurcating in the middle of the margin. The vein is lined up. Ginkgos are dioecious, and the male and the female flower are borne separately in spring. The male flower is borne in the inflorescence in the form of a small mulberry. The male flower is light yellowish green without petals and has 2 to 6 stamens. In female flowers, two ovules are formed at the end of a stalk

and one of them develops into seed.

The fruits are round and ripe in yellow in October. They have a foul smell and cause inflammations when contacted with the skin. The seeds, called ginkgo nuts or "Baekja," are ovoid-elliptical, whitish and have 2 to 3 layers. It is said that the branches of the male plants tend to grow upward like raised hands, while those of the female plants tend to grow horizontally, but it is not clear until the fruits are borne.

Cultivation

Along with Sawleaf Zelcoba, Hackberry, and Pagoda Tree, ginkgo is one of the longest living trees. There are a several ginkgo trees designated as a natural monument in Korea. Ginkgo inhabits well in any kinds of soil, is strong against disease and pests, and grows very fast.

Propagation is made by seeds or grafting. Sow the seeds in March to April. Cover them with straw or shading net to maintain humidity for better germination. Sprouting period varies depending on the seed. Seedlings grow tall and erect, and its growth speed is considerably faster than grafts. However, it is hard to distinguish the male/female tree in the case of seedlings. For grafting, graft a good-quality bud to the understock of the seedling.

Medical Uses

Ginkgo seed is edible. In oriental medicine, it is called "Baekgwa" and used as a medical herb. It has a bitter sweet astringent taste and plain properties with a little bit of toxicity. It

acts on lung and kidney meridians. It is effective in the treatment of cough, sputum, and asthma. Therefore, the seed can be applied to both kinds of cough and asthma caused by heat or weakness in the lung.

According to "Illustrated Book of Korean Medicinal Herbs" written by Deok-gyun Ahn, Baekgwa (ginkgo seed) is: "Effective when the color of urine is white and the color of leucorrhea is yellow and has bad odor due to moist fever. With insecticidal effect, it is used in the treatment of scabies and contagious skin diseases. Draining effects of the ginkgo seeds act on the treatment of mastitis. Ginkgo leaves are effective for coughing and asthma. They improve blood circulation of the coronary artery, heart and brain blood vessel and decrease hyperlipidemia."

Ginkgo seeds are beneficial if you take a small amount for a long time or a proper amount as medicine depending on symptoms. However, it is not recommended to take the ginkgo seeds raw or in large amount at once. Overdose of ginkgo seeds may cause vomiting, diarrhea, abdominal pains, convulsion, and

pulmonary edema, and in the worst case, may lead to death caused by pneumonia or respiration failure. Poisoning may result if you take about 150 seeds in empty stomach. When the ginkgo seeds are cooked, its toxicity considerably decrease.

According to "Grand Dictionary of Chinese Medicines," it is said: "Ginkgo seeds contain a small amount of cyanic acid glycoside, gibberellin, and cytokinin. 2 kinds of ribonuclease are found in the endosperm. The episperm contains toxic components of ginkgelic acid, hydroginkgolic acid, hydroginkgolinic acid, bilobol, and ginnol. It also contains asparagine, formic acid, propionic acid, lactic acid, and octanoic acid.

Ginkgo suppresses staphylococcus, streptococcus, diphtheria bacillus, anthrax bacillus, hay bacillus, colon bacterium and typhoid bacillus, though to a different degree. Stronger antimicrobial property is seen in the fruit flesh than in the skin. Ginkgo infusions suppress fungus activities, too."

Due to such toxicity of ginkgo, if you put a ginkgo leaf in a book, moths will not eat the paper. Placing ginkgo leaves in corners of the house can help chase away insects such as cockroaches. Ginkgo has an excellent anti-insect properties.

In organic farming, such toxicity of ginkgo can be used as a natural pesticide. Extract fresh juice from the leaves or fruits, decoct them with water or infuse them in alcohol for use.

Narcissus

The major toxic component is lycorine contained in red spider lilies or magic lilies, mainly found in the bulb. In folk medicine, people pound the bulbs and apply them to festered area, various boils, and wounds. It is also used to treat phlegm or whooping cough.

Narcissus (Narcissus tazetta var. chinensis Rome.) is a perennial plant in the family Amaryllidaceae, known to be native to the Mediterranean coast. It is assumed that the plant was introduced from China to Korea long time ago. It is mainly cultivated for ornamental purposes, but a lot of wild narcissuses are found in warm southern regions including Jeju Island and Geomoon Island. The genus "Narcissus" originates from a handsome boy named "Narcissus" introduced in the Greek Mythology. The boy was drowned to death because he

fell for his own face reflected in water. It is said that a narcissus was borne on the place that the boy died.

The bulbs in the ground are broad egg-shaped and have white fibrous roots and dark brown barks. They are layered like onions and the line-shaped leaves are produced from the bulbs in late autumn. At maturity, the leaves are 20 to 40 cm (8-16 in) long and 8 to 15 mm (0.3-0.6 in) wide. Leaves have rounded tip and white color.

In December to March, 5 to 6 flowers are borne facing sideway at the end of the flower stalk shooting up among the leaves. 6-lobed petals are usually white or light yellow, and there is a yellow corona in the middle that resembles a gold cup.

Cultivation

Propagation is made by bulbs as the narcissuses do not bear fruits. A great number of species are developed and it is easy to purchase various species at reasonable price. The bulbs are sold in autumn before the leaves are produced. In spring, flower-bloomed narcissuses are sold.

It is recommended to transplant the bulbs in October or November. Transplantation should be complete at least by the mid-December. Plant the bulb twice as deep as the height of the bulb.

Use well-drained soil when potting. Plant the bulb in a place with good drainage for outside cultivation. Otherwise, the bulbs rot in the soil and no

sprouts appear in spring.

After the flowers fall off, cut the flower stalk from the root. For potting, dig the bulbs in June when the leaves begin drying up. Sufficiently dry up the bulbs and store them in a cold dark room. In case of leaving the narcissus planted, it is recommended to place it in a cool area as the plant is weak against summer heat.

Medical Uses

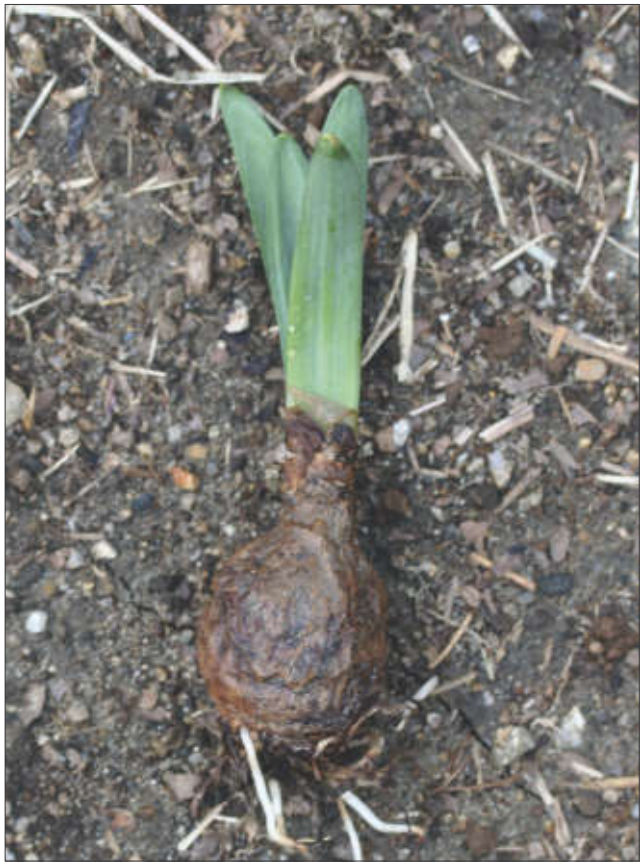
Narcissuses are usually planted for ornamental purposes. In folk medicine, people pound the bulbs and apply them to festered area, various boils, and wounds. It is also used to treat phlegm or whooping cough.

According to "Grand Dictionary of Chinese Medicines," it is said: "Narcissus has a sweet bitter taste and cold properties with toxicity. It treats furuncles and infectious boils, discharges pus, reduces swellings, decreases fever, treats

stroke, various insect bites and fishbone stuck in throat."

The major toxic component is lycorine contained in red spider lilies or magic lilies. In addition, the alkaloids including galantamine, tazettine, pseudolycorine, pretazettin, and hemantidine are also contained in the plant. These alkaloids have considerable anticancer and antiviral effects and are mainly found in the bulb.

Lethal dose of lycorine is known to be 10 g. Toxic symptoms include vomiting, mood-drops, abdominal pains, diarrhea, and dehydration shock. When a small amount is used, the plant accelerates secretion of bronchial mucosa and loosens phlegm. It also decreases fever by expanding peripheral blood vessels. For this reason, lycorine is used as apophlegmatics in the treatment of acute laryngitis, asthma, and bronchiectasis.



As lycorine is water-soluble, you can eat the starch of the bulb after soaking it in water for a long time or boiling it. Glue made from narcissus starch that stick together papers will repel insects.

In organic farming, narcissus bulbs can be used as a natural pesticide. Extract fresh juice from the bulbs or infuse them in water or alcohol for use.

Greater Celandine

In oriental medicine, the whole plant of Greater Celandine is called "Baekgulchae." In May to July, the whole plant with flowers and leaves is collected and dried in a well-ventilated, shady place for medical uses. The plant has a bitter, spicy taste and slightly warm properties.

Greater Celandine (Chelidonium majus var. asiaticum) is a biennial plant in the family Papaveraceae, commonly found around farm houses, roadsides or meadows. When injured, the plant exudes yellow latex. The name "Agiddong-pul" (baby poop plant) was given because the shape and color of the latex looks like a baby's poop. The stem is empty and the leaves are alternate compound, crenate, and irregularly pinnatifid like radish leaves. Greater Celandine grows to 30 to 80 cm (12-31 in) and the stems, veins and buds are coarsely covered with

white hairs. The root stretches straight and deep, and is yellow.

The deep-yellow flowers are borne from spring to summer. Several flowers, 2 cm (0.8 in) in size, appear at the apex of the flower stalks coming from the flower axils in umbel. Therefore, you can commonly find a flower and a fruit being attached together on the same inflorescence. The flowers consist of 4 yellow petals with abundant stamens and one pistil with dully divided tip. When the yellow petals fall off after pollination, the ovary under the pistil grows to become a tapering cylindrical seed. The seed is propagated by ants.

Cultivation

It is not difficult to obtain this plant as it grows everywhere near houses like a weed. It is better to transplant the Greater Celandine right after sprouting. However, if it is hard to identify the Greater Celandine only with sprouts, spot them during flowering and transplant. The root is easily seated when transplantation is made right after sprouting. When the plant grows large enough to pro-

duce flowers, the rooting is not easy. In that case, it is important to avoid dryness and maintain enough humidity until the root is seated.

As the Greater Celandine is not a perennial plant, you should gather the seeds after the flowers fall off, if you want to continue to cultivate the plant. Sow the seeds collected in autumn. Before sprouting, make sure to avoid dryness in soil. The preferred cultivation habitat for the greater celandine is a sunny place with enough sun light. In a shady place, Greater Celandines dry up or grow slowly.

Medical Uses

In oriental medicine, the whole plant of Greater Celandine is called "Baekgulchae." In May to July, the whole plant with flowers and leaves is collected and dried in a well-ventilated, shady place for medical uses. The plant has a bitter, spicy taste and slightly warm properties. It is used as pain killers in the treatment of gastroenteritis and gastric ulcer. It is also used in the treatment of shigellosis, hepatitis, skirt ulcer, tuberculosis, scabies, and dry patch.

The yellow latex coming from the injured stem and leaves contains various kinds of alkaloids. 0.97 to 1.87% of alkaloid is contained in the whole plant; among them, 41% is chelidonine, 22% protopine, 17% stylopine, 9% allocryptopine, 5% berberine, 3% chelerythrine, 1.5% samguinarine, and 0.1% sparteine.

Those with weak skin may have an inflammation just by contacting this latex. Overdose leads to poisoning. It causes strong gastric irritation and in the worst case, it may lead to unconsciousness and paralysis in the vasomotor center. The alkaloids contained in the Greater Celandine suppress various microbes.

Chelidonine has a pain-killing effect to some extent, although it is not as effective as opium. Chelidonine is known to perform the same local anesthetic action as the morphine in opium does, without addictive quality. In China, it is said that the dried Greater Celandine was used as a substitute of opium.

In organic farming, toxicity of the Greater Celandine can be used as a natural pesticide. Extract fresh juice from the plant, decoct it with water or infuse it in alcohol for use.

Japanese Snowbell

In the past, Japanese snowbell trees were used in fishing as its fruits and leaves contained egosaponin, a component that can anesthetize small animals. Large amount of egosaponin is contained in the fruit skin.

Japanese snowbell (Styrax japonicas Siebold & Zucc.) is a deciduous tall tree in the family Styracaceae, growing up to 10m. It is commonly found in sunny places near valleys. The bark is dark brown and furrowed on the surface. The leaves are ovate or ovoid, alternate, and have an acute tip and a slightly serrated or plain margin. In May to June, the bell-shaped white flowers bloom from the inflorescence of the leaf axis, hanging below the foliage in a group of 2 to 6 flowers. The elliptical fruit is borne in September. When ripe, its skin is irregularly split to bring the seed out.

Japanese snowbell trees are used for landscaping trees because the flowers are pretty, fragrant and very strong against cold climates and pollution. The size and arrangement of the lumber cell is constant and thus, the lumber is so nice that the annual ring is not easily shown. The lumber was used to make a sack for farming tools, necklaces, toys, and Korean chess pieces, as it is easy to manufacture but not easily split. The seed oil was used as hair cosmetic and the flower scent was used as a perfume ingredient.

Cultivation

Japanese snowbell trees are commonly used as landscaping trees and is easy to obtain from garden centers. For propagation, cut the new branch in spring in 10 cm (4 in) length and apply a rooting compound on the bottom of the branch and plant it. Or collect the seeds in autumn for sowing.

Basically, it is hard to grow in pots as the tree grows very tall. Shady areas are not recommended as the tree prefers sunny places. For planting, plow the

soil about 50 cm (20 in) deep, although this may vary according to the size of the tree, and add the leaf mold if organic matter are insufficient in the soil.

Medical Uses

Since long before, Japanese snowbell trees were used in fishing as its fruits and leaves contained egosaponin, a component that can anesthetize small animals. When you release the pounded fruits or leaves of the Japanese snowbell in water, fish float up. In addition, egosaponin dissolved in water removes greasy spots on clothes as soapy water does. In the past when no laundry detergent was available, people used to wash clothes in water mixed with pounded Japanese snowbell fruits. In folk remedy, the flowers of Japanese snowbell were used in the treatment of throat pains and toothache, and the leaves and fruits for diseases caused by wind and moisture.

In particular, large amount of egosaponin is contained in the fruit skin.

According to "Constituents and Medical Uses of Herbs," it is explained: "About 10% of egosaponin is contained in the fruit skin. About 45% of oil is contained in the seeds. The oil consists of glycerides including palmitic acid, stearic acid, linoleic acid, lauric acid and myristic acid, and 5 to 8% of non-saponificated egonol is also contained. Saponin is found in the flowers."

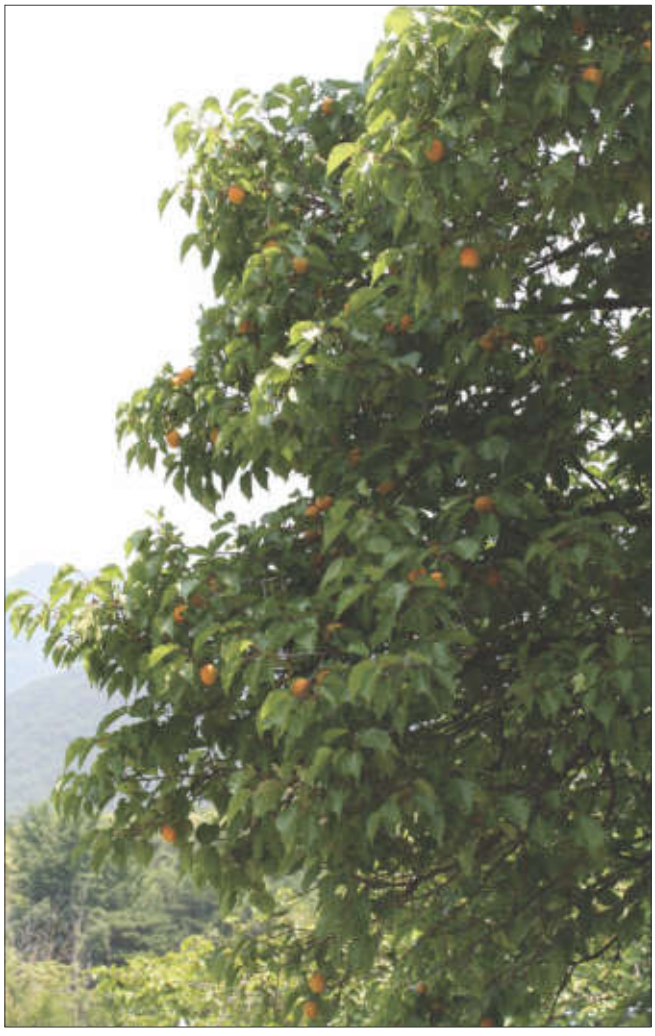
The throat is seriously irritated if you eat the fruit improperly. It is not a lethal dose but the esophagus and the stomach may become ulcerated. In addi-

tion, egosaponin is protoplasm poison, causing hemolysis and hemocatheresis and leading to unexpected symptoms. Japanese snowbell, however, has a very bitter taste, and therefore, it is unlikely to swallow its fruits unless the person is seriously insensitive. Usually, people tend to spit out the fruit right after putting it in the mouth. In the case of the Japanese snowbell seeds, it is said that an egg yolk is a treatment when you accidently eat the seeds, but it does not seem to be a fundamental solution.

In organic farming, the Japanese snowbell fruits can be used as a natural pesticide. Extract fresh juice from the fruits, decoct them with water or infuse them in alcohol for use.

Apricot Tree

The toxic component in apricots is amygdalin, mainly found in unripen fruits and seeds. About 3% of seed is amygdalin. When amygdalin is ingested raw, it is hydrolyzed by oxygen, generating hydrogen cyanide.



Apricot tree (Prunus armeniaca var. ansu Maxim.) is a tall tree in the family Rosaceae, growing up to 5 m (16 ft). Native to China, it is not certain when apricot trees were first introduced in Korea, but it is assumed that the trees had lived in the wild prior to the Three Kingdom Era (around 3 century BCE). The barks are reddish and the young branches are brownish purple. The leaves are wide ovate, alternate and with irregularly serrated margin. The light red flowers bloom in April before the leaves appear. Almost no flower stalk is found and there are 5 round petals.

The fruits are round, hairy, and 3 cm (1.2 in) in diameter. In June to July, the fruits ripen

in yellow or yellowish red. The fruit flesh is easily separated from the seed. 90% of the fruit consists of fruit flesh and the main ingredient is sugar. 1 to 2 percent of the fruit is organic acid like citric acid and malic acid. Among mineral ingredients, potassium is the major ingredient, taking up 59% of minerals. 5 to 8 mg of beta carotene that has vitamin A effects is contained in dried apricots. People eat fresh apricots, or eat them as dried fruits, jam, canned food or drinks.

Cultivation

Apricot can be cultivated throughout the country (Korea) but it does well in regions that does not have late frost damage around the time of flowering season. The root is not at all flood-tolerant and the tree may wither in a place with high ground water level and poor-drained soil. Apricot cultivars are most often grafted on apricot, plum, prune or peach rootstocks.

Plant the seedlings in autumn or spring: mid-November to early-December in autumn before the ground freezes after fallen leaves; by mid-March at the latest in spring when the ground is defrosted. Rooting and growing is faster in autumn planting than in spring planting. Plant the seedlings in the distance of 6X6 m (20X20 ft). In the case of intensive culture in the form of Y-shaped trees, place the seedlings 6 m (20 ft) between rows and 2 to 2.5 m (6.6-8.2 ft) between each tree. Apricot cultivars are

particularly self-sterile and therefore, it is recommended to plant 20 to 30% of pollinizer trees along with the cultivars.

Medical Uses

In oriental medicine, apricot seeds are called "Haengin" and used for the treatment of cough, asthma, bronchitis, sore throat, acute pneumonia, and constipation as it works on reducing fever, stopping cough, loosening phlegm, and treating furuncles. Apricot seeds are used for female skin care.

According to "Dictionary of Oriental Medicines," "Haengin" is: "The dried seeds of apricot and wild apricot, a tall tree in a species of Prunus. Apricots and wild apricots grow throughout mountains and meadows of the country. Collect the ripened fruits and remove the fruit flesh to get the seeds. Put the seeds in boiling water to eliminate the seed skin. You can use it as it is or after roasting it.

Haengin has a bitter and sweet taste and has warm properties. It acts on the lung and large intestine meridians. It stops cough, treats shortness of breath, helps bowl movement, release sweat, and neutralize poison. Clinical experi-

ments reveal that the amygdaline acts on loosening phlegm. Haengin is used in the treatment of cough caused by various reasons, constipation and having an upset stomach after eating meat. Take 6 to 12 g of Hangin a day by decocting it with water, or in powder form, or make it into pills."

Due to its toxicity, you should take caution in taking Hangin. Unripe fruits are not good for health. The toxic component in apricots is amygdalin, mainly found in unripe fruits and seeds. About 3% of seed is amygdalin. When eaten in raw, amygdalin is hydrolyzed by oxygen, generating hydrogen cyanide. Hydrogen cyanine, when used in a tiny quantity, can stimulate the respiratory and vascular centers and therefore can be used treat respiration difficulties. However, large quantity of hydrogen cyanine may paralyze the respiratory center and lead to death from suffocation.

Poisoning symptoms include dizziness, vomiting, and dilatation of the pupils; when it gets serious, decreased consciousness, convulsion, and respiration failure may occur, and lead to death.

"Grand Dictionary of Chinese Medicines" states that "first aid for neutralizing poisoning is to give the patients decocted apricot tree barks or roots." There is no reported case of use of apricot in organic farming, but there seems to be a possibility in using unripe fruit or seeds. Extract fresh juice from the unripe fruits or decoct them with water for use.

Nandina

Its effects include diuresis, cough suppression and fever reduction. It is used as a rinsing agent for asthma and tonsillitis or a bathing agent. When using nandinas as medicines, correct dosage should be observed. Nandinine and domesticine are the major toxic components contained in nandinas.

Nandina (Nandina domestica Thunb.) is a shrub in the family Berberidaceae, native to Japan and China. As it is not cold-hardy, the plant is mostly cultivated in southern regions in Korea for ornamental purposes. In the mid-to-northern regions of the country, nandinas are usually grown in greenhouses or pots. Nandina is an evergreen, but sometimes sheds leaves in a cold region. The plant generally grows to 1 to 3 m (3.3-10 ft) tall with bundled stems. The gray bark is vertically furrowed.

The glossy leaves are tri-pinnately compound that consists of 3 leaflets, usually arranged at the tip of the stems. The leaflets are ovoid and lanceolate with the acute tip.

The leaves are first dark green and turn red in autumn. The flowers are white, borne in June to July in conical clusters held well above the foliage. The fruit is a round red berry that ripens in October. In garden varieties, some fruits are white or light purple.

Cultivation

The plant can be cultivated in any kind of soil, as long as the soil quality is not very poor, but its preferred habitat is well-drained soil in half-shady places. Propagation is mostly made by cutting or grafting. Propagation by seeds is also possible. For transplantation, do not cut the stem too much. Its buds do not appear easily and the root is not deeply seated.

If possible, purchase plant over 50 cm (20 in) tall in the gardening/landscaping center for easy growing. When planting for landscaping purposes, gather 3 to 4 nandinas in a group. Avoid dryness until the root is properly seated after transplantation. For potting, water the plant generously when the soil surface is dry. Once the root is seated, nandinas are very strong and management is relatively easy.

Medical Uses

Its effects include diuresis, cough

suppression and fever reduction. It is used as a rinsing agent for asthma and tonsillitis or a bathing agent. The stalks and velamen are effective for gastric diseases, ulcers, and narcolepsy.

According to "Grand Dictionary of Chinese Medicines," the nandina fruits "have a sour-sweet taste and plain properties. It acts on stopping cough, loosening phlegm, reducing liver fever, and improving eye heath. It heals chronic cough, asthma, pertussis, malaria, and chancre decay." However, when using nandinas as medicines, strictly adhere to the designated dosage.

Various alkaloids are contained in the entire plant. O-methyldomesticine is the major component contained in the fruits, in addition to protopine, isocorydine, nandinine, and doemsticine. The root mostly contains domesticine and o-methyldomesticine, in addition to nandazurine, berberine, jatrorrhizine. The stems and branches contain magnoflorine, berberine, jatrorrhizine, menisperine (N-methyll isocorydinium), domesticine, o-methyldomesticine, nandazurine, and isoboldine.

If you put on a nandina leaf on cooked rice mixed with red beans, the rice will not spoil for a long time, as the nandinine in

the leaves reacts with heat and moisture to generate a very small amount of hydrogen cyanide.

Hydrogen cyanide has a very strong toxicity, that amount is too small to be harmful. However, the amount of nandinine exceeding a certain dose irritates the respiratory center, leading to paralysis. Domesticine may also directly act on the central nerve and cause convulsion, paralysis of sensation and respiration, leading to death.

Toxicity of nandinas can be used as a natural pesticide in organic farming. Extract fresh juice from the fruits, leaves and stems; decoct them with water; or infuse them in alcohol for use.

Water Pepper

People pounded the whole water pepper to catch fish. When you turn away the running water and release the water pepper extracts to stagnant water, the bronchial nerves of the fish are paralyzed and they float up.

Water pepper (Persicaria hydropiper) is an annual plant in the family Polygonaceae, mostly growing at the damp edges of wetland or stream. The water pepper is also called "Beodulyeoqui" as its leaves resemble willow leaves (willow being "beodul" in Korean), and it is sometimes called "Maewoonyoequi" or " Maepjaengi" (where "mae" means hot taste) as the entire plant including the leaves have a pungent taste. Its English name "water pepper" is also derived from its pungent taste.

The water pepper grows to 40 to 80 cm (16-31 in) in height. It has no hairs and the stems split vigorously. The water pepper leaves resemble willow leaves: they are 3 to 12 cm (1.2-4.7 in) long, 1 to 3 cm (0.4-1.2 in) wide and arranged alternately. The stipule looks like a leaf sheath. It is semi-transparent like a thin paper and has hairs at the margin. The flowers

are borne from June to September in inflorescence shaped like drooping grain. The grain is 5 to 10 cm (2-4 in) in length. There is no petals and the light green calyx is divided into 4 to 5 parts with reddish spotted tip. There are 6 stamens and 2 styles. The fruit is black, obovate, and surrounded by the calyx.

Cultivation

It is not necessary to describe special cultivation methods as the water peppers are commonly found weeds at the damp edges of wetland or stream. If you really want to cultivate water peppers, sufficiently damp soil is preferred. Water pepper is a useful shallow water bog plant which purifies water quality just like Korean persicary or other genus of Persicaria. Like most of weeds, the water pepper also has times of diapause. As the seeds are well protected by the spornioderm, they can usually stay in soil for 3 years, and up to 20 years, provided that the surrounding environments permit.

When the seeds are swept away by water because of natural climate changes,

or when the seeds are exposed by exterior disturbances, such as plowing, clod breaking, and weeding, they will germinate due to their photoblastic characteristic. Such characteristic prevents the seeds from getting germinated all at once, thereby increasing survivability of species. In addition, the water peppers grow fast in the early stage of growth, and secrete allelopathic substances in the later stage to restrain growth of nearby plants.

Medical Uses

In Japan, the sprouted water pepper is used for fish dish or as a garnish accompanied with sashimi. Traditionally, people pounded the whole water pepper to catch fish. They turn away the running water and release the water pepper extracts to stagnant water, then the bronchial nerves of the fish are paralyzed and the fish float up.

For medical uses, collect the whole plant when the flowers bloom and pick up the fruits in autumn and dry them. Water pepper stops bleeding so is used to treat internal bleedings in areas like womb or hemorrhoid. Leaves and stems contain a large amount of tannin, thus has excellent antibacterial function. They also have essential oil components expand blood vessel and decrease blood pressure while increasing tension in small intestine and uterus. Apply the extracts when bitten by snakes or venomous insects. The plant extract is also effective for exterminating parasites.

According to "Donguibogam (Eastern Medicinal Manual)," the seed (yosil) of water pepper has "cold properties and pungent taste with no toxicity. The energy of this medicine

enters into the nose. It eliminates bad energy from kidney, brightens eyes, and removes moisture. It treats furuncles and other skin diseases and makes the energy flow in the five viscera. Overdose causes vomiting of water and chest pains and harms yang (positive) energy."

Not much research is done regarding the toxic components of water peppers but careless ingestion may lead to vomiting accompanied by serious seizure. It is dangerous if pregnant women eat water pepper, and eating the water pepper with garlic during menstruation may cause adverse side effects. It seems that the water pepper does have a certain level of toxicity, as demonstrated by its effect of exterminating parasites or paralyzing fish.

In organic farming, water pepper can be used as a natural pesticide. Extract fresh juice from the whole plant, decoct or infuse it with water for use.

Sophora Root

In the past, the sophora root, with its excellent anti-insect effects, was used to exterminate parasites on animal skin and maggot in squat toilets. Nowadays, sophora root is used as a natural pesticide in organic farming to control mealybugs, aphids, mites, etc.

Sophora (Sophora flavescens Solander ex Aiton) is a perennial plant in the family Fabaceae, which commonly grows at roadside meadows with sun light. It grows to 80 to 150 cm (31-59 in) tall. The erect stems have several stalks at the tip and woody hard bottom. The plant is overall green, but a couple of stipule with purple patterns is at the tip of the petiole attached to the stem. The leaves are oddly pinnate and arranged alternately.

In June to August, butterfly-shaped light yellow flowers, 20 cm (8 in) in

width, are borne at the end of stalks in receme, leaning on one side. The calyx looks like a bucket and has hairs and slightly 5-lobed at the end. When the flower falls off, a narrow and long bean fruit, 7 to 8 cm (2.8-3.1 in) long, is produced. There are 4 to 5 seeds inside the fruit. The space between one seed and another narrows, creating the shape of rosary beads. The fruit is vertically drooping down. It is green in the beginning and turns black when ripe.

The name "Gosam" came to be from the fact that the root used for medicines is very bitter ("go" means bitter). Astragalus propinquus root ("huangqi," important herb in oriental medicine) looks very similar to the sophora root; it is not easy to distinguish the two. Sophora root has a bitter taste and cold properties, while Astragalus propinquus root has a sweet taste and warm properties.

Cultivation

The plant sophora prefers well-drained sandy or clay soils. Plant the seeds in late March to mid-April in much the same way as sowing beans. It is recom-

mended to collect the seeds when the bean fruits of sophora are sufficiently ripe. As the sophora is hardly ever cultivated or sold, you should personally search for and collect the seeds or dig the roots for planting.

It is hard to find the plant in the city but is easy to spot them in nearby hills or sunny roadsides. Cultivation is easy as the sophora has a tenacious hold on life. However, it is better to cultivate sophora in a well-lighted sunny side. It doesn't grow well in the shady area. A support is not necessary since the sophora is not a vine, but can be useful in preventing the plant from falling in strong wind.

Medical Uses

The major toxic components contained in the sophora root are matrine and cytisine. These toxic components are contained in the entire plant but cytosine is mainly found in the seeds and matrine in the roots. The strong bitter taste of the sophora root – strong enough to induce vomiting – comes from matrine. Major poisoning symptoms that appear when you take the cytisine by mouth include burning-hot feeling in the mouth, thirsty throat, vomiting, abdominal pains, diarrhea, dyspnea, speech disability, visual disturbance, hearing impairment, unconsciousness, and respiratory paralysis.

"Properties and Uses of Herbs" says "Dig out the root in autumn, rinse it with water and dry in sun. It is called 'Gosam' because it has the same effect as ginseng ("sam" means ginseng), although much more bitter. The entire plant has alkaloid components. In oriental medicine, sophora root is used as a stomach medicine, diuretic, fever reducer, pain killer, and insecticide. It is also used in the

treatment of jaundice, difficulties in urination, scabies, eczema and psoriasis. In addition, with its astringent hemostasis function, the sophora root is also used in the treatment of bloody flux, diarrhea, hemorrhoid, and vaginal bleeding."

According to "Illustrated Book of Korean Medicinal Herb," written by Ahn, Deok-gyun: "Sophora root has a bitter taste and cold properties. It is effective in treating jaundice, dysentery, leucorrhea, and vaginal itchiness. For itchiness, rinse the affected area with the sophora root decocted water. The sophora root is also used to treat itchy skin, pustule, scabies and tinea, and it is also effective for treating poor urination and pains, caused by continuous fever."

In the past, sophora root, due to its excellent anti-insect effects, was used to exterminate parasites on animal skin and maggots in squat toilets. These days, sophora root is used as a natural pesticide in organic agriculture for exterminating pests, such as coccids, aphids, and mites. Many natural pesticide products in the market contain sophora root extracts as a major ingredient. Extract fresh juice from the root and the whole plant, decoct it with water or infuse it in alcohol for use.

Chinaberry (Neem)

Chinaberry roots and stem skins are called “Goryeonpi” and the fruits are called “Goryeonja.” It is mainly used as anthelmintic. The flowers have anti-insect effects. The flowers placed under the mat eliminate fleas and lice, and the scorching smoke of flowers shoo away mosquitos.

Chinaberry (Melia azedarach L.) is a deciduous tall tree, growing to 15 m (49 ft). It is widespread in the southern regions of Korea, Japan, Taiwan, and Southeast Asia. The leaves are alternate and pinnate compound. The leaflets are ovoid or elliptical with a coarsely serrated margin. The pale purple flowers are borne in clusters at the end of the stalks around May. There are 5 petals and calyxes, respectively, and 10 stamens are grouped like one barrel. The fruit is a drupe, marble-sized, and yellow at maturity in September.

Chinaberry belongs to the same family Meliaceae as the Indian neem (Melia

azadirachta L.), which is well-known for "Neem Oil." The Indian neem is an evergreen and the flowers are white. Fruits of Chinaberry were used to make Buddhist rosary thus the origin of its name, "Wooden Bead Tree." Chinaberry is called "Ghoda neem" in the Bengal regions of India; "Ghoda" in Hindi means a horse.

Cultivation

It is easily grown in the southern coastal regions, islands and temperate southern regions, such as Jeju, South Gyeongsang province and South Jella province. It is not cold-hardy but when the tree grows, its cold-tolerance increases to some extent. It is strong against disease and pest insects. It grows relatively fast and requires generous amount of sunlight and moisture. In good soils, it can grow over 1 m (3.3 ft) within 2 years of cultivation by seeds and it becomes a relatively tall tree within 7 to 8 years. In the wild, propagation is done by birds, such as Brown-eared Bulbul.

For propagation, collect the fruits in late autumn and remove the fruit flesh

to get the seeds out. Store the seeds in underground in open field and sow the seeds next March or April. Avoid dryness in the seeds and the seed bed. Germination rate is relatively high.

Medical Uses

Chinaberry roots and stem skins are called "Goryeonpi" and the fruits are called "Goryeonja." It is mainly used as anthelmintic. It kills ascaris and causes diarrhea. It also eliminates threadworms and hookworms, and inhibits pathogenic fungi. The flowers have anti-insect effects. The flowers placed under the mat eliminate fleas and lice, and the scorching smoke of flowers shoo away mosquitos.

According to "Donguibogam (Eastern Medicinal Manual)": "Chinaberry treats high fever that is accompanied by insanely stifling feeling caused by fever-related diseases and cold energy in torso. It improves urination, exterminates 3 worms in the abdomen and cures scabies and canker sores."

The toxic components are mainly contained in the fruits. They are fine for

birds but harmful for humans. If you take more than a certain amount, the following poisoning symptoms appear a few hours later: loss of appetite, vomiting, constipation or diarrhea, melena, abdominal pains, pulmonary hyperemia, stiffness and convulsion, and cardiac arrest. In the worst case, death occurs in 24 hours. Such a symptom is related to azadirachtin, a major anti-insect chemical ingredient in the Neem oil. Azadirachtin is known to affect about 200 species of insects by disturbing ingestion and growth.

In organic agriculture, Chinaberry can be used as a natural pesticide. Grind the fruits by grinder and boil them in water twice as much as the ground fruits in low heat for more than 6 hours and strain them. Mix the boiled fruits with salt or 30% alcohol, or seal tight while hot for storage. Or collect the yellow fruits in autumn, dry them completely and squeeze the oil like Neem oil.

Mint

Menthol that produces a unique refreshing feeing is made by distilling the mint leaves or stems. Menthol is a colorless acicular crystal that is not quite soluble in water but dissolves well in ethanol, ether or chloroform.

Mint (Mentha piperascens) is a perennial plant in the family Lamiaceae; is a widely known herb. Its preferred habitats are wet grasslands. The stems are square, and the entire plant is covered with hairs and it grows to about 60 cm (24 in). The leaves are long-elliptical, arranged in opposite pairs with serrated margin. There is sebaceous gland on the surface and a tangy refreshing scent comes out when touched. The pale-purple, grain-shaped flowers are borne in cluster on the leaf axil between summer and autumn. There are 4 stamens and the tip of the stigma splits across.

Tens of the mint species are cultivated throughout the world and it is largely divided into western species and eastern species. Western species are classified into peppermint (M. piperita), spearmint (M, spicata), and pennyroyal mint (M. pulegium), depending on the properties of essential oil. The eastern species is also called “Mentha arvensis” and divided into the red stem mint and the blue stem mint.

Peppermint has no hairs on the leaves and stems, and the grain-shaped flowers are borne in cluster on the stem. Spearmint has a very short or no petiole. Its flower cluster is smaller

than that of peppermint. Spearmint has a long and narrow flower spike. Pennyroyal mint is a spreading type plant. The reddish stems grow low, spreading out on the side. Eastern mints, compared to western mints, have high contents of menthol in essential oil, which make them good base materials for menthol. However, the eastern mints also have high contents of menthone, which produces less scent and more bitter taste, and therefore, their quality as perfume is relatively low.

Cultivation

Mints usually prefer temperate climates, and they grow easily in the southern regions of Korea. They like sunlight but are intolerant to dry soils or drought. Well-drained, loamy or sandy-loamy soil with moisture is the preferred habitat. Propagation is mostly done by cutting or division of rhizomes. In late autumn, make a seedbed to plant the seminal root. Or leave the rhizome alone and divide and plant the rhizome when it grows to 10 to 15 cm (4-6 in) next year. Or cut the stem in 3 to 4 nodes in July before the first harvest and bury it in ground to establish the root.

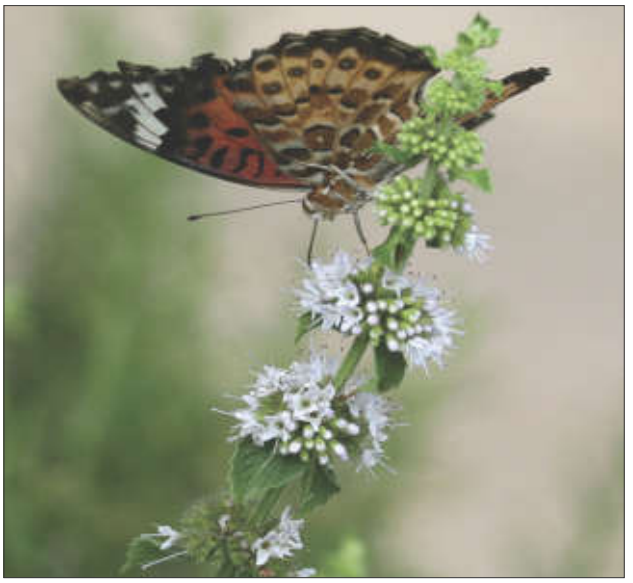
Essential oils contained in the mint leaves or stems are most copious and best in quality at the time of flower blooming. Cut the plant and dry it in shade when the lower leaves of the plant gradually turn yellow while the flowers are borne and the leaves are healthy. If the plant is dried in the sun, not only moisture but also active ingredients are evaporated. In addition, if it rains a lot during harvesting period, the oil content drops. About 1.3 to 2% of the essential oil is contained

in the whole plant. The main ingredient of the essential oil is menthol, taking up 77 to 78%, followed by methone of 8 to 12%. Content of menthol varies depending on the species or types of mints.

Medical Uses

In oriental medicine, the dried leaves and stems of the mints are called "Bakha" and used in the treatment of early stage of cold, headaches, sore throat and skin diseases as sweating agent, fever reducer, pain killer, stomach medicine, and antidote. It is also effective for treating irritable bowel syndrome, nausea, vomit, and diarrhea. In addition, its unique scent helps eliminate bad breath (halitosis).

Menthol that produces a unique refreshing feeing is made by distilling the mint leaves or stems. Menthol is a colorless acicular crystal that is not quite soluble in water but dissolves well in ethanol, ether or chloroform. Taken in a large amount, a tongue-stinging sensation occurs, but a small amount of mints creates a refreshing feeling. It is added to medicine and medical supplies, snacks



and cosmetics. It is also used as a pain killer or to stop itchiness.

According to "Dictionary of Oriental Medicines": "Mint has a pungent taste and cool properties. It acts on lung, cardiac membrane, and liver meridians. It eliminates fever caused by wind, stops pains, treats rashes, and improves liver energy. In the pharmacological test, it is revealed that the mints expand skin capillaries, facilitate sweat gland function, reduce fever, expand coronary vessel, facilitate digestive gland function, promote gastric function, alleviate pains, ease myalgia, restrain bacilli, treat inflammation, and have preservative function. The mint oil is used to treat chills caused by wind fever, cold caused by wind fever, headaches, swelling and pain in the throat, coronary vessel circulation disorder, cardiac pain, gastritis, dyspepsia and bronchitis. Take 4 to 8 g a day by decocting it or making into pills or powders. When used as external medicines, rinse the affected area with mint-decocted water or pound the fresh mints to make juice and apply it. Do not decoct the mints for a long time."

Not many cases are found of mints being used as a natural pesticide, but it is known that some pennyroyal mint or peppermint species have antibacterial and anti-insect effects. In particular, pennyroyal mint was used to repel fleas in the past so has a potential as repellent against flies, mosquitos, fleas, and ants. As menthol is not water-soluble but easily dissolves in ethanol, soak the plant in ethyl alcohol or alcohol for use.

Rosemary

It is assumed that the unique scent and essential oil of the plant repel insects. It is helpful to plant rosemary when cultivating cabbages, beans, carrots or Small Flowered Sages in order to prevent pest insects.

Rosemary (Rosmarinus officinalis L.) is an evergreen shrub in the family Lamiaceae, native to the Mediterranean region in southern Europe. It is one of widely used herbs. It grows to 1 to 2 m (3.3-7 ft) and has square stems and multiply-divided twigs. The leaves are arranged linearly in opposite pairs, 1.5 to 3.5 cm (0.6-1.4 in) long, and with the margin curled backward. The glossy front is dark green and the spotted back is covered with white hairs.

The pale blue, white, pink or purple flowers bloom in winter and spring. The flowers are mostly arranged in cluster at the end of the leaf axil of the upper

stem. The corona shapes like lips; the upper are is two-lipped and the lower are is three-lipped and there are purple spots in the middle.

The entire plant including the stems and leaves has as astringent and unique aroma. The name "rosemary" comes from Latin for “dew” (ros) and “sea” (marinus), thus “dew of the sea” (rosmarinus). Although it originated from the Mediterranean region, rosemary is widespread in Europe and the temperate regions of America and is frequently used as an ornamental gardening plant.

Cultivation

Propagation is mostly made by seeding or cutting. Germination requires the soil to be at least 20°C (68°F), so sow the seeds in May. Sowing soil should be well-drained. However, once seed is dried up it would not sprout. So cover the seeds with straws or newspapers after sowing to avoid dryness. Germination takes place in about 2 weeks. For cutting, June to July or September to October is recommended. The best time for planting a cutting is when the mature stem of the year is hardened and lignified to a certain extent. Cut the stem 7 to 10 cm (2.8-4 in) long and take away 1/3 of the lower leaves and plant it. In a semi-shady place, the root is usually seated in 20 to 30 days.

Its preferred habitat is well-drained, relatively dry soil with

enough sunlight. Let the plant bathe in the sun for all day once a week and expose the plant to the wind as much as possible. Do not water the plant too frequently. Give enough water when the surface soil is whitish-dry. Rosemary likes alkaline soil. Add limestone or dried/grinded egg shells when repotting. Rosemary doesn't like transplantation. In the initial repotting, use a big pot to cultivate the plant in one place for several years.

Medical Uses

Rosemary is used after being dried in shade. The leaves and twigs are usually used to flavor various meat dishes or eliminate bouillon like odor. Rosemary is a good seasoning for soups, stews, or barbecue sauce, and the sprinkle of rosemary complements boiled vegetables, such as potatoes or cauliflowers. It is also effective for eliminating halitosis. Rosemary flowers and leaves are preserved with sugar to be served as a snack or a tea. In Europe, rosemary has a very old reputation (since the Ancient Greek Era) for improving memory and brain functions. Rosemary has been used as a medicine to warm up the body.

For medical uses, the essential oil is mostly extracted from rosemary. The major ingredient of rosemary oil is borneol (0.3 to 2%), obtained by distillation. It is effective for improving robustness, tranquilization, digestion, and

convergence of the body, eliminating negative wind energy and fighting against bacteria. Rosemary oil is particularly effective in the treatment of headache. With its excellent aesthetic effects, its extracted solutions are used as ingredients of tonic waters, shampoos, hair tonics, conditioners, and eau de cologne.

Rosemary is known to be safe to take in general, but overdose may cause adverse effects like unconsciousness, convulsion, vomit, or pulmonary edema. In particular, pregnant or breastfeeding women should not take a large amount of rosemary.

Rosemary is a strongly pest-resistant plants. It is assumed that the unique aroma and essential oil of rosemary prevent insects from getting close to the plant. Planting rosemary along with cabbage, beans, carrots or Small Flowered Sage will help repel pest insects, such as cabbage worms, bean weevils and carrot flies. Decoct the rosemary leaves and stems with water or infuse them in alcohol for use.

Bracken

The immature, tightly curled emerging fronds are collected and consumed as salad or soup. The entire plant, dug out in autumn and dried in sunlight, is used as diuretics or fever reducers. In the West, the root is said to be used as anthelmintic of tapeworms and ascaris or as a contraceptive.

Bracken is a perennial Pteridophyta, a genus of widespread ferns in the world. They are found on all continents in the temperate and tropical regions except deserts. In the past, the genus was commonly treated as having one species, Pteridium aquilinum, but the recent trend is to subdivide it into 12 species. Bracken growing in Korea is Pteridium latiusculum, and it is widely

distributed throughout Northern Europe, Asia, and North America.

The thick and dark rootstock 1 cm (0.4 in) in diameter widely creeps to all directions and the fronds grow from the rootstock. Thanks to this deeply seated underground rootstock, bracken even survives forest fires and propagates prior to other plants. The long stem may grow up to 1 m (3.3 ft) long, and the part buried underground is dark and densely covered with brown hairs. The leaves are wide ovate triangular and bi- or tri-pinnate. Sporangia are formed underside of the mature leaves. Propagation is made when the spores pop out from the sporangia and dropped to the ground.

Cultivation

To cultivate bracken, it is essential to foster the rootstock at least 1 year or more. In the beginning, purchase the rootstock from a specialized store or dig out a good-quality wild rootstock from mountains for use. Bracken is easily found in all mountains of the country. However, it is not easy to dig it out, as the plant grows in a place with hardened soil and abundant rocks, and the root is deeply seated.

The best time to dig out the rootstock is from October/November when the stalk dries up to early-to-mid March when underground ice starts melting. The rootstock collected before winter should be stored in the ground to prevent dryness and freezing damages.

The rootstock is usually planted in early-to-mid March before snow melts down. Cut the rootstock 20 to 30 cm (8-12 in) in length and plant it in the distance of 60 to 90 cm (24-35 in) and 10 cm (4 in) or deeper in depth. One or two-year-old rootstock is good for planting as it has a tenacious hold on life. Since the aged rootstock grows slowly, a larger number should be planted in a narrower furrow. After planting the rootstock, cover the soil with bundles of straw or fallen leaves. During the drought season in summer (July to August), water the entire field to avoid dryness in particular. When the stalk dries up in late autumn, leave during winter, and in the next spring, incinerate or eliminate it before new sprout appears.

Medical Uses

Collect the immature, tightly curled emerging fronds in early spring and boil them with water. Consume them as a vegetable dish or for soup and obtain starch from the rootstock. You can also dig out the entire plant in autumn and dry it under sunlight and then use it as a diuretic or fever reducer. With its anti-inflammation and detoxification effects, the plant is also used to treat cuts by knife or snake bites. In the West, the root is said to be used for anthelmintic of tapeworms and ascaris and as a contraceptive.

According to "Donguibogam (Eastern Medical Manual)": "The immature fronds, known as fiddleheads, is called

"Gweolchae." Gweolchae has cold properties. It is soft and sweet and reduces an abrupt fever and improves urination. It tastes very good when boiled with water. However, it should not be consumed for a long time. Long consumption will decrease the stamina, weaken leg muscles, deteriorate vision, and cause bulging stomach."

In particular, raw brackens should not be over-consumed. There are cases of farm animals, such as cows, horses or sheep, dying from poisoning from consuming a large amount of bracken. The major toxic components found in brackens are aneurinase and hudikyrosite. Aneurinase destroys vitamin B1 and can incur beriberi with symptoms of difficulty in walking and impossibility of erect standing, and hudikyrosite is known as a carcinogen. However, consuming the immature fronds just once in a while by sufficiently boiling and infusing with water will not create any problems.

There has been a recent report that researchers are searching for a new pesticide ingredient from brackens. There is ample possibility to use brackens as a source of natural pesticide, since its root is sometimes used as anthelmintic. The rootstock is known to be 5 times more toxic than the leaves. For the natural pesticide, it may be effective to boil the rootstock or mature stalk.

Climbing Bagbane

It is excellent for treating arthritis, neuralgia, extravasated blood, beriberi, knee-aches, and hypertension. But overdose may cause respiration and cardiac paralysis.

Climbing bagbane (Trachelospermum asiaticum) is an evergreen vines in the dogbane family Apocynaceae, commonly found in the southern regions of Korea. They have roots growing from the long-stretched stem nodes, climbing up entangling other objects. They mostly live in a group on rocks or tree stumps, but sometimes, they climb up living trees. The leaves are ovate and in opposite pairs. Small leaves are 1 cm (0.4 in) in length, while big ones grow to

7 to 8 cm (2.8-3.1 in). The leaf surface is dark green and glossy. In a dry place or in winter, however, the leaves turn red-brown. The leaves have flat margin. Some have a clear white vein and others not.

The flowers bloom in May to June. 5 to 6 flowers are borne in cluster on one flowers talk. The flowers are 2 to 3 cm (0.8-1.2 in) in diameter, with 5 white petals joined together as the base to form a windmill. Like the honeysuckle flowers, they turn yellow as time goes by, producing delicate scent. The fruits borne in autumn are shaped like a long adzuki bean pod. They are 10 to 20 cm (4-8 in) long and arranged in opposite pairs. When ripe, the fruits split open and the seeds with pappus hairs fly away in the wind like a dandelion.

Cultivation

Cultivation is unnecessary since it is easily found on the ridge or mountains in the southern regions of Korea. In the central-to-northern regions, or when you want to grow it as potted plant in the city, it is recommended to purchase the plant from a garden center or obtain the plant by cutting. For cutting, cut the stem by 15 cm (6 in) in spring before the buds appear or in June or July and remove the lower leaves before planting. After planting, shade the sun and avoid dryness. The root is relatively easily seated. For seeding, collect the seeds in autumn and directly sow them in the field or mix them with sand and plant them in the next spring.

The plant grows well in shady places, but the flowers hardly bloom in that case. If you want to produce flowers, it is recommended to grow the plant in relatively sunny areas. The plant likes moderately moist soil but it tolerates dry conditions very well. When you grow the plant in the pot, give sufficient water when the surface soil is dry, and store it inside in winter for caring. As it is a vine, it is recommended to provide a support to curl on since early stage. Flowers are borne only after several years.

Medical Uses

It is excellent for treating arthritis, neuralgia, extravasated blood, beriberi, knee-aches, and hypertension.

According to "Dictionary of Oriental Medicines":

"'Masakjul' is the dried stems and leaves of the climbing bagbane, an evergreen vine. The climbing bagbane grows in clumps or on rocks at the mountain foot in the southern regions of Korea. The stems attached with leaves are cut in summer and dried for medical use. It has a bitter taste and cool properties. It

acts on the heart, liver, and kidney meridians. It eliminates negative energy caused by wind and moisture and improves circulation of meridian system. It is used in the treatment of body convulsion, low back pain, arthralgia, tonsillitis, and furuncle. Take 5 to 10 g a day by decocting it with water."

The stems contain arctiin, tracheloside, matairesinoside, nortracheloside, dambonitol, β-sytosteryl glucoside, and chimaros.

Excessive ingestion may cause restraint and paralysis in respiration and cardiac functions. According to pharmacological tests, arcitin is known to decrease blood pressure by expanding blood vessel and cause convulsion on cold- and warm-blooded animals. Overdose leads to dyspnea. Poisoning symptoms include diarrhea, vomit, and cold sweat. The pulses become irregular, followed by dyspnea and cardiac arrest, finally leading to death. The toxicity of the climbing bagbane can be used as a natural pesticide in organic agriculture. Decoct the entire plant with water or infuse it with water for use.

Hinoki cypress

Hinoki cypress contains a considerable amount of essential oil that generates the phytoncide. According to a research, antifungal effects of the Hinoki cypress oil are similar to or higher than copper sulfate, a substance used as a pesticide ingredient.

Hinoki cypress (Chamaecyparis obtuse) is an evergreen tall tree in the family Cupressaceae, native to Japan, and was first introduced to Korea in the early 1900s and cultivated in the southern regions. In Japanese, it is called Hinoki. The tree is a narrow conical shape and grows up to 30 to 40 m (100-130 ft) tall and 2 m (6.6 ft) in diameter. The spreading branches are pendulous and the dark red-brown bark is thinly peeled out vertically. The scale-like small leaves are in opposite pairs, and arranged 4 in one group. The leaves at the upper and lower area of the tree are short and blunt-tipped, while the leaves on both sides are slightly long, with a white Y-shape band on underside of the leaf and with a unique scent.

In April, the elliptical male flowers and the ball-like female flowers are borne at the tip of the stalk separately. The fruits are small cones, 1 cm (0.4 in) in diameter and red brown. They consist of 8 to 10 scales and each scale contains 2 to 5 seeds. With excellent quality as timber, the tree has been used as high-quality construction materials or interior materials in Japan. Similar to hinoki cypress, there is Sawara cy-

press. Unlike Hinoki cypress, Sawara cypress has a white W-shape band on underside of the leaf. Sawara cypress grows better in moist soil than Hinoki cypress. Sawara cypress grows fast but its timber quality is lower than Hinoki cypress.

Cultivation

The trees are easily grown in well-drained deep soil, at the mountain foot and valley lower than 400 m (1,300 ft) in elevation above sea level in the warm-temperate and temperate southern regions. They are tolerant to relatively dry and sterile soil, but they are not cold- or salt-hardy. In addition to its value as good quality timber, Hinoki cypress forest recently came to spotlight as very beneficial for health.

For cultivation, purchase young seedlings or make propagation by seeds or cutting. For propagation by seeds, collect the seeds in September to October; store them in a dry place; and sow them in the next spring. For cutting, the branch of the previous year is trimmed by 10 to 15 cm (4-6 in) length in April, and it is placed in water for 2 to 3 hours. The leaves at the lower area are removed and half of the branch is planted in the ground. After cutting, shade the branch from the sun and apply rooting stimulants for better growing. For 3 to 5 years after planting, slightly mow, prune, and thin the tree on a frequent interval to prevent the forming of thick nodes.

Medical Uses

In the forest comprised of evergreen conifers such as Hi-

noki cypress, you can smell a unique and refreshing scent. This pleasant scent comes from phytoncide. Phytoncide is a compound word made by combination of phyton (means plant in English) and cide (means killer in English), and it's a generic terms for natural antifungal substances that plants and trees secrete to protect themselves from pest insects or diseases. The phytoncide consists of terpene, phenolic compounds, alkaloid components and glycoside.

The known effects of phytoncide include improvement of allergic and skin disease, such as atopic dermatitis, enhancement of antifungal functions, neutralization of odor and harmful substances, enhancement of human body's immunity, tranquilization, generation of pleasant feeling, and alleviation of stress. As shown in the table below, Hinoki cypress contains considerably higher amount of essential oil that generates the phytoncide, compared to other trees.

Korea Forest Research Institute conducted a test to find out effectiveness of decreasing cortisol, a stress-generating hormone, for 4 kinds of conifers: Hinoki cypress, Pine tree, Nut Pine, Sawara cypress. The test results indicated that the essential oil extracted from Hinoki cypress is remarkably more effective for reducing cortisol level. In addition, the Animal Medicine Research Institute at Chungbuk National University diluted the Hinoki cypress oil to 5% concentration and injected the diluted oil into staphylococcus and legionella. The results confirmed that Hinoki cypress oil was as effective as general antibiotics. Another study also indicated that Hinoki cypress oil is very effective against "formaldehyde," a substance causing the sick house syndrome, as well as dust mites causing atopic dermatitis.

According to a research, antifungal

Species	Winter	Summer	Species	Winter	Summer
Needle Fir	2.9	3.3	Japanese Cedar	3.6	4.0
Korean Fir	3.9	4.8	Hinoki Cypress	5.2	5.5
Pine Tree	1.7	1.3	Sawara Cypress	3.1	3.3
Nut Pine	1.6	2.1	Juniper	1.8	1.4
Rigid Pine tree	0.7	0.8	Arbor vitae	1.0	1.3

Essential Oil Content in Domestic Conifer Leaves (Unit: ml/100g)

Source: Park, Jae-cheol, 1991. <Environment and Landscaping>

effects of the Hinoki cypress oil are similar to or higher than copper sulfate, a substance used as a pesticide ingredient. Not many cases are found of Hinoki cypress being used in organic agriculture, but there is ample room for future possibility. In particular, what draws our attentions is that the Hinoki cypress oil has strong antifungal effects, and as a natural substance it will not develop resistance within the disease organism. This is in stark contrast to conventional antibiotics where the developing of resistance is a chronic problem. Break the Hinoki cypress leaves and stems in small pieces and perform pressure distillation to obtain the essential oil.

Hinoki cypress can be used as a natural pesticide. Blend and extract fresh juice from the leaves, decoct them with water or infuse them in alcohol for use.

Garlic

Allicin is the most effective ingredient in garlic; it has sterilization and anti-insect effects. It is good to consume allicin during cold season or in the treatment of enteritis and colitis. Allicin also has excellent sterilization effects on tubercle bacillus, vibrio cholera, dysentery bacillus, and N.gonorrhoea.

Garlic (Allium sativum L.) is a species in the onion genus in the family Amaryllidaceae. It is usually cultivated as a perennial plant. It is assumed that garlic is native to Central Asia and is widespread throughout Korea, Japan, India, the entire tropical Asian regions, and Southern Europe. According to record, garlic was widely cultivated in ancient Egypt. It is assumed that garlic was first introduced to Korea through China and its cultivation history traced back to the remote past, as a record of garlic is found in the chapter of Dangun mythology in the "The Heritage of the Three States."

It grows to 60 cm (24 in) and has shallowly spreading fibrous roots. The round conical bulb is formed under the stem. The bulb is surrounded by light-brown, bark-like leaves, and 5 to 12 small scales which is a clove of garlic. They are formed in a round row inside. The clove of garlic usually consists of 3 sides and has a round triangular pyramid shape.

The leaves are long-lanceolate and 3 to 4 leaves are arranged alternately at the stem. In July, the light purple flowers are borne in umbel at the end of the flower stalk coming from the leaves. There are 6 perianth lobes and the gemmae are densely hung between the flowers. The fruiting season is September.

Cultivation

Due to its long history of cultivation, numerous species were created. The species is classified by planting areas and period, extent of floral axis' growth and the number of garlic cloves in the bulb.

In Korea, garlic is largely classified into the warm-season garlic and the cold-season garlic. The warm-season garlic is mostly early maturing cultivar; the root establishment begins in late August to early September and new sprouts appear soon after seeding. Growth continues and wintering is made when the plant is pretty much matured. The number of garlic cloves is 10 to 12. It is less spicy and intolerant to storage. In contrast, cold-season garlic is rooted after seeding, but does not germinate before wintering but during defrosting. The number of garlic cloves is 6 to 8. It has a strong spicy taste and long storage.

In general, the multi-clove-garlic (warm-season garlic) is cultivated in the warm southern regions of Korea, and the six-clove-garlic (cold-season garlic) is cultivated in the central-to-northern regions. If cold-season garlic is cultivated in the warm regions, the size of garlic clove decrease due to insufficient chilling. On the contrary, if warm-season garlic is cultivated in the cold regions, growth is poor and production decreases due to damage by frost. In general, cloves are planted in September to early October in the southern regions and harvested in early June. In the central inland regions, the cloves are planted in early-to-mid October and harvested in the mid-to-late June.

Plant the cloves standing upright, leaving enough space of 20 cm (8 in) between lines and 10 cm (4 in) between heads, and in sufficient depth of soil (5 to 7cm, or 2-2.8 in), 2 to 3 times deeper than the cloves. If the cloves are planted deeper than this length, the bulb of garlic gets smaller. If they are planted shallower than this length, damage by frost increases in winter and more garlic comes out in poor quality. In the central-to-northern regions, cover the soil with bundles of straw, fallen leaves or compost, if not using vinyl covers.

Medical Uses

In Korea, garlic has been used as a seasoning for almost all food. Korean people parboil the garlic stalk and serve it as a vegetable dish or preserve garlic in soy sauce to make garlic pickle. In oriental medicine, garlic is called “Daesan” or “Hosan” and is used as a medicinal ingredient.

According to "Dictionary of Oriental Medicines": "Garlic has a spicy taste and warm properties. It acts on the spleen and stomach meridians. It facilitates body energy circulation, warms up the spleen and stomach, and treats cold. In addition, it prevents infectious diseases, kills parasites, detoxifies, and treats furuncles. According to experiment, garlic is also effective for antibiosis, restraint of influenza virus, improvement of stomach functions, blood pressure falls (when a small amount is used), prevention of arteriosclerosis, anti-cancer action, immunity revival, stimulation of urination, and womb contraction."

Allicin is the most effective ingredient in garlic; it has sterilization and anti-insect effects. It is good to consume allicin during cold season or in the treatment of enteritis and colitis. Considerable amount of allin, a kind of amino acid, is contained in garlic. When you chew or chop garlic, the allin is decomposed into the allicin and the diallyl disulfide, which generates a strong scent of garlic. It is good to consume the allicin during cold season or in the treatment of enteritis and colitis. Allicin also has excellent sterilization effects on tubercle bacillus, vibrio cholera, dysentery bacillus, and N.gonorrhoea.

Garlic extract and garlic oil containing allicin is known to have anti-insect, repellent, nematicidal, and sterilizing actions for a wide range of agricultural pests. Simply grind raw garlic to extract juice or decoct it in water or alcohol for use in organic farming. However, take caution about applying heat because heat will destroy the enzyme, eliminate the spicy taste, scent, and sterilizing effects.

Onion

The bulb is usually consumed. It has a sweet and spicy taste and warm properties without toxicity. Onion is used for soups, curry, and various other meat dishes.

Onion (Allium cepa L.) is a biennial or perennial plant in the genus Allium that belongs to the family Amaryllidaceae. The round bulb in the ground is used as vegetable. It is assumed that the onion is native to Iran, Pakistan and nearby northern mountain areas.

In the Egyptian fresco dating to around BCE 3,000, onion was drawn with garlic. Onion has a long history of cultivation and it is grown in almost all parts of the world. In Korea, onion was first introduced in the early 1900s, and was called "Yangpa" because it came from the west ("yang") and had the same scent as scallions ("pa").

The leaves are hollow and cylindrical, 30 to 50 cm (12-20 in) long and arranged alternately in group. The leaves get dry when the flowers are borne and the base of the leaves consists of thick scales. The bulb is flattened-round or round, 10 cm (4 in) in diameter and covered with purplish thin brown skin. The layered inner scales are thick and have spicy taste. In summer, the thick flower stalks, 50 to 100 cm (20-40 in) long, are stretched out and the flower-head takes the form of a globular umbel of white flowers. The seeds are black and 2 to 3mm long.

Cultivation

In Korea, the seeds are planted in the seedbed in August to September and the young seedlings are planted to the field in October, and the onion is harvested next June.

The seeds are planted earlier if they are early cultivated species or in the inland regions where winter comes first. If the seeds are planted too early, the plant overgrows, generating more division and floral axis. In the southern re-

gions, it is desirable to plant the seeds in early September. Cover the soil 0.5 cm (0.2 in) thick and mulch the area with straws. Water the cultivation area using a thin-holed watering can for several times, avoiding exposure or leaning of the seeds. It is important to keep the soil moist until germination. When the sprouts grow to 1 cm (0.4 in), 6 to 7 days later, remove the straws.

It is suitable to do permanent planting 25 to 30 days before the average temperature drops to 4°C (39.2°F), as the minimum temperature for growing young roots is 4°C (39.2°F). Shallowly plant the seedlings, 25 to 30 cm (10-12 in) tall and with 4 leaves, 3 cm (1.2 in) deep, in the distance of 15 cm (6 in). If you make a ridge and vinyl mulching before the permanent planting, the soil temperature increases and moisture is kept in soil, which facilitate root seating and growth and increases production. The onion is one of crops that require a lot of fertilizers. In addition, the onion doesn't grow well nor does the bulb in acid soil. Add limestone to make the soil acidity reach ph 6.3 to 7.3. Harvest the onion when the leaves fall off and become dry.

Medical Uses

The bulb is usually consumed. It has a sweet and spicy taste and warm properties without toxicity. Onion is used for soups, curry, and various other meat dishes. The onion is sometimes used for pickle or salad, and in such a case, red onion is mostly used as it has less spicy taste and beautiful color. In oriental medicine, onion is used in the treatment of wound, ulcer, bacterial vaginosis, hyperglycemia, and diabetes. Onion is also effective in treating vitamin deficiency.

The strong pungent scent and spicy taste in raw onion is derived from sulfur compounds such as allyl propyl disulfide and allyl sulfide. With pungency, these compounds stimulate the nerves. In addition, they facilitate blood circulation and work on detoxification. With its strong sterilization effects, they destroy staphylococcus aureus and diphtheria bacillus and treat trichomonas vaginitis. The allyl sulfide increases absorption of vitamin B1, and allyl propyl disulfide decreases blood sugar. The quercetin, a yellow pigment in the onion, is known to be effective for anti-oxidation and prevention of hypertension.

Hot Pepper

The pungent taste in the hot pepper comes from capsaicin. More capsaicin is contained in the placenta, the white area that the seeds are attached to, than the skin. When touched to sensitive skin areas, such as mucous membrane of the eyes and mouth, it creates a burning sensation.

Hot pepper (Capsicum annuum L.), native to the central tropical America, is a perennial plant, but in Korea, it is cultivated as an annual plant. It is assumed that the hot pepper was introduced through Japan around the time of Imjinwaeran (Japanese Invasion in the year 1592).

It grows to 60 cm (24 in) tall. Leaves are alternate, ovate, and lanceolate, with narrow ends and flat margin. In summer, the white flowers are borne on the leaf axil. The fruits are 5 to 10 cm (2-4 in) long, conical and turn red at maturity. As crossbreeding is easy for hot peppers, numerous varieties were created while spreading throughout the world. In Korea, more than 100 species are cultivated.

Cheongyang red pepper, which is also called, Ddaengcho or Cheongyangcho, famous for its pungent taste, is a late-flowering red pepper that contains a large amount of capsaicin. Content of capsaicin in Cheongyang red pepper is 250 to 300 mg per 100 g, 12.5 to 15 times higher than green chilies. The Cheongyang pepper has a strong

scent and thick skin, enabling a long storage of the taste. However, its production decreases in low temperature and less sunshine.

Cultivation

Hot pepper is a megistothern crop and a good temperature for growing is 25°C (77°F). Hot pepper grows well in well-drained rich soil. If you directly plant the seeds on the field for cultivation, production decreases. It is recommended to grow the seedlings in greenhouses and transplant them. In case of open field culture, seeds are usually sown in early February in the southern regions and permanently planted in early May, and in the central regions, the seeds are sown in mid-to-late February and permanently planted in mid-May, although it varies depending on the species.

Green chilies are harvested from mid-June to early August. Red peppers are harvested for 3 to 4 times after mid-August.

In case of planting the seedlings, do not leave the seedling in the pot for a long time. Plant them within 3 to 4 days after purchase. Pick a sunny day, and make sure to water the pot sufficiently one day before planting. When planting, keep the depth that the seedling is planted in the pot. If the seedling is planted too deep, the rooting is late because a new root comes from the stem. If it is planted too shallow, it is easy to get damaged by drought. Make the furrow as high as possible and avoid intensive culture to decrease generation of pathogenic diseases and pests, such as epidemic or anthrax. If you

mulch, the plant grows faster and weed management is easy because of increase in soil temperature.

Medical Uses

Hot pepper is used as a seasoning for various foods including Kimchi. It contains more vitamin than tangerines or apples. In oriental medicine, hot pepper fruit is called "Beoncho" or "Dangsin," and the hot pepper fruit-decocted water is applied to frostbites or is used in the treatment of neuralgia or muscle pains. The pungent taste of the hot pepper facilitates movement of the digestive system and production of gastric acid, aiding digestion. In addition, it burns out fats and decreases cholesterol, and rids the feeling of cold. It also helps fermentation of food and prevents rancidity. However, excessive ingestion may create macules or hurt the stomach.

The pungent taste in the hot pepper comes from capsaicin. Pure capsaicin is volatile, hydrophobic, colorless, odorless crystalline to waxy compound. It is not easily destroyed by heat. More capsaicin is contained in the placenta, the

white area that the seeds are attached to, than the flesh. When touched to sensitive skin areas, such as mucous membrane of the eyes and mouth, it creates a burning sensation. It is used as tear gas spray against protestors. Overexposure to capsaicin may create dyspnea, paleness or convulsion. Ingesting a large amount of pure capsaicin may lead to death.

Hot peppers produce capsaicin to protect themselves from other animals, while spreading the seeds to promote propagation. An observation of the animals consuming Chillan hot peppers in the south of Arizona, US, revealed that capsaicin prevents animals from consuming hot peppers by acting as a poison. However, peppers were of preferred food for animals that help spread its seeds, like birds. Seeds would travel far in the birds' excrements.

Capsaicin also inhibits bacillus. Even 1/10,000 diluted solution has antifungal effects. It is used to prevent blackleg in potato and mosaic disease in tobacco. In organic agriculture, hot pepper is extracted for fresh juice (as in garlic) and mixed with other toxic plants to control diseases and pests. Peppers high in capsaicin like Cheongyang red pepper is more effective.

Common Purslane

In oriental medicine, the dried whole plant, called Machihyeon, is mostly used in the treatment of urological diseases and swelling, such as gonorrhea and urethritis. It reduces fever, neutralizes poisons, eliminates extravasated blood, kills parasites, and aids urination.

Common purslane (Portulaca oleracea) is an annual succulent plant in the family Portulacaceae, commonly found along roadsides, vegetable farms, and vacant spots. It is widespread in temperate and tropical regions. Breeding was done in India and Europe for cultivation. The plant grows to 15 to 30 cm (6-12 in) tall and has smooth, reddish brown stems without hairs. The stems are separated into several parts and grow mostly prostrate at the bottom or obliquely standing. The leaves are obovate and arranged in opposite pairs or alternately, but they look like a cluster from the top.

The yellow flowers are borne at the end of the stem from May. There are 5 petals and no peduncle. The flowers open in the morning and close at midday. The flower buds are also closed in shady or rainy days. The fruits are elliptical and ripen in August. The upper part is taken out like a lid at maturity. Inside finds a long pod filled with densely packed seeds. The root is white, but turns red when pounded. The plant that belongs to the same genus includes the rose moss (P. grandiflora).

Cultivation

Purslane has excellent regeneration and propagation abilities that allow 4 croppings within one year. When the situation doesn't permit, purslane is self-fertilized by closed-pollination, and the seeds attached do not stop growing even if the root is taken out. Due to characteristics of succulent plants, purslane is also tolerant to dryness and survives for several days even if taken out of soil in mid-summer. Such resilience makes purslane a troublesome weed in farming. In particular, purslane has strong allelopathy against sesame.

Propagation is made by dividing suckering or by seeds. Purslane prefers rich and almost acidic soil with enough moisture. The plant likes sunlight and does not grow well in shady places. It takes about 6 to 8 weeks from sowing to harvest. For early harvesting, sow the seeds early in the hotbed. Planting can be made from late spring to summer in the open field. A new stem continues to grow even if the leaves and stems are cut which enables harvesting throughout the entire summer.

Medical Uses

Purslane is used for salad, along with lettuce in the West. In Korea, people parboil the soft leaves and stems slightly in salt water, dry them in sunlight and make them into a vegetable dish in winter. In every 100 g of fresh leaves, 300 to 400 mg of omega-3 fatty acid, in particular, alpha-linoleic acid, which is unsaturated fatty acid mostly contained in fish or seaweed, is contained. Purslane is also abundant in potassium (560 mg). In addition, it contains vitamin, magnesium, calcium, noradrenaline and dopamine.

In oriental medicine, the dried whole plant, called Machihyeon, is mostly used in the treatment of urological diseases and swelling, such as gonorrhea and urethritis. According to "Dictionary of Oriental Medicines," "The whole plant is collected between summer and autumn. After steaming or parboiling, dry it in sunlight. Sometimes, the fresh plant is used. It has a sour taste and cold properties. It acts on the heart and large intestine meridians. It reduces fever, neutralizes

poisons, eliminates extravasated blood, kills parasites and aids urination."

According to "Constituents and Medical Uses of Herbs," "The extraction of the whole plant in alcohol has antifungal effects against colon bacterium, Shigella, and typhoid bacillus. According to clinical researches, purslane shows a clear treatment effect in trichomonas and shigellos. Potassium salts in purslane improves urination. Take the purslane decocted water in the treatment of shigellosis, gastroenteritis, and bacillary dysentery. Take or rinse with the purslane decocted water in the treatment of swelling, erysipelas, scabies, and eczema. In addition, make an injection for the treatment of postpartum hemorrhage and vaginal bleeding. To treat ancylostomiasis, decoct 300 g of fresh leaves and take it. Purslane is also used to neutralize insect and snake poisons and has great effects in the treatment of various pus-related diseases and rectal cancer."

Red betacyanin and yellow betaxanthin, natural pigments, are found in the red stems and the yellow flowers of purslane. These natural pigments are known to have strong antioxidant (anti-aging) and anti-mutation properties. Extract fresh juice from the plant or infuse it in water or alcohol for use.

Heartleaf (Eoseongcho)

It is called "Eoseongcho" as the leaves and the stems smell like fish (Eo is fish, seong is smell, cho is plant). The plant has a strong antifungal, neutralizing, and urination effects. It is said that the heartleaf has an excellent effect in treating numbness of hands and feet caused by agricultural chemical poisoning.

Heartleaf (Houttuynia cordata Thunb.) is a perennial plant in the family Saururaceae. The leaves and the stems smell like fish. It grows in moist, shady places in Ulleung Island, Anmyeon Island, Geoje Island, as well as the southern regions of Korea. It is widely cultivated throughout Japan and South East Asia.

Heartleaf grows to 20 to 50 cm (8-20 in) tall and the white, thin subterranean stems are trailing sideward for propagation. The leaves are alternate and shaped like the heart, resembling the buck wheat or sweet potato leaf. Under-

side of the leaf is purple. In May to June, the greenish-yellow flowers are borne on a terminal spike at the end of the stem. 4 large white involucres looking like petals are supporting the inflorescence, which makes the entire group look like one flower, but the actual small flowers arranged on the inflorescence consist of 3 stamens and pistils without petals and calyxes. The fruits are capsular, and the seeds are light brown.

Chinese Lizards Tail, the plant in the same family and frequently mentioned along with the heartleaf, has longer inflorescence, and the top 2 to 3 leaves turn white around the flowering season; hence the name Sambaekcho (sam is three, baek is white, cho is plant). Another theory is that the Chinese Lizards Tail is called as such because its leaves, flowers and roots are all white.

Cultivation

Heartleaf grows well in moist to wet soil in partial sun, rather than in direct sunlight. When planted under the trees or at the backyard, it grows rapidly with strong reproduction rate. Propagation is made by cutting and planting of rootstock in autumn. Cut the root 3 to 5 nodes (10 cm or 4 in) in length and plant it horizontally in soil 3 to 5 cm (1.2-2 in) deep. The appropriate furrow distance is 20 cm (8 in) and the distance between roots is 10 to 15 cm (4-6 in).

It is better to water right after planting. In the central regions, the above ground part sometimes is damaged by frost, delaying new sprouts. Therefore, it is safe to make mulching by straws or rice husks in winter.

When you want to grow only a small amount at home, it is better to plant it in a pot or a box because the heartleaf has strong reproduction ability. Take out the leaves for use until the flowers bloom. When the flowers are borne, cut the whole plant and dry it in shade for later use. According to a research, the content of quercetin, one of the major ingredients of the heartleaf, reaches the highest in late April, which is the early time of growth. The content decreases until the flowering season and then it goes up again after the flowering season. The highest content is found in the flowers.

Medical Uses

In Japan, the heartleaf is called "Dokudami (poison controller)" as it is believed to have an excellent detoxification power. It is said that the heartleaf has an excellent effect in treating numbness of hands and feet caused by agricultural chemical poisoning. In Japan, the heartleaf is widely used not only for medicine and medical supplies, but also for healthy food and esthetic supplies. Recently in Korea, a lot of esthetic and healthy products related to the heartleaf are de-

veloped. “Jeupchae” or “Sipyak” are names of the plant rooted out in the flowering season and dried in shade and used as medical herb in oriental medicine.

According to “Dictionary of Oriental Medicines,” “Jeupchae has a spicy taste and cold properties. It acts on the liver and the lung meridians. It reduces fever, neutralizes poisons, improves urination, and decrease edema. Pharmacological tests revealed that Jeupchae improves the heart function and urination, strengthens capillary, and has strong antifungal effects. It is used in the treatment of pneumonia, lung abscess, gonorrhea, urethritis, cystitis, metritis, mastitis, anal fistula, tinea pedis, and abscess. Take 9 to 15 g a day as herbal infusion. For external use, extract the juice and apply it to the affected area. If you drink it as a tea constantly, it will prevent arteriosclerosis.”

According to “Constituents and Medical Uses of Herbs,” it explains “Fish smell of this plant is caused by decanoyl acetaldehyde and laurin aldehyde. These two ingredients are only contained in the fresh whole plant, and the heartleaf essential oil obtained by distillation only contains transformed by-products, such as methyl-n-nonyl-ketone, myrcene, and capric acid. The leaves contain quercitrin, and the flowers and the fruits contain isoquercitrin.

Decanoyl acetaldehyde has anti-fungal abilities against apathogenic fungi, Trichophyton, tinea pedis bacteria, staphylococcus, gonococcus, and acid-fast bacteria. The anti-fungal ability against staphylococcus is very strong. The quercitrin shows strong activity for improving urination and the heart functions. In addition, it also has anti-fungal effects against colon bacteria, typhoid bacillus, para-typhoid bacillus, shigella, gonococcus, staphylococcus, and mold fungi; and strengthens the capillary. The isoquercitrin also strengthens the capillary.”

In organic agriculture, heartleaf can be used as a natural disinfectant. Extract fresh juice from the plant, decoct it with water or infuse it in alcohol for use.

Potato

Solanine, the toxic component contained in potato is found in high concentration in the leaves, sprouts, peels and buds. Solanine is produced by the plant to protect itself from insects, pathogenic bacteria, and predators; thus has disinfection and anti-insect effects.

Potato (Solanum tuberosum L.) is an annual plant in the family Solanaceae, known to be native to the highlands of the Andes Mountains of South America. Potatoes were introduced to India and China through Europe in the sixteenth century. There is a record in the book "Ojuyeonmunjangjeonsango" written by Gyugyeong Lee of late Joseon dynasty that potato first was introduced between 1824 and 1825 through the north. According to the record described in "Wonjeobo" written by Changhwan Kim, when a British merchant ship stayed at the shore of North Jella province for one month in 1832, a missionary from the ship distributed seed potatoes and taught cultivation methods.

Potatoes are widely cultivated in throughout the temperate regions in the world. They grow 60 to 100 cm (24-40 in) high. Underground stolon grows from stem nodes and edible tubers are formed at the tip of stolon. Sprouts appear from the dented buds of tubers. The leaves are produced from each node of the stem and are mostly compound leaves consisting of 3 to 4 pairs of leaflets. A long floral axis appears from the upper leaf axil in June and the pale purple or

white flowers are borne in centrifugal inflorescence. The flowers are 2 to 3 cm (0.8-1.2 in) in diameter and 5-lobated. When the flowers fall off, small fruits resembling tomatoes are produced.

Cultivation

Potatoes prefer well-drained field in relatively cold regions. For spring cultivation, sow the seeds from late February to late April to avoid frost damages on sprouts. Prior to sowing, seed potatoes are split up in small pieces, leaving more than one bud in each piece to weigh 25 to 30 g. Big seed potatoes are usually divided into 2 to 4 pieces and the small ones are planted without division. It is recommended to store the pieces in shade for 3 to 4 days to give some time to cure the cutting area. It is also a good idea to coat the cutting area with ash. Depending on the regions, the seed potatoes are planted in summer and harvested in autumn.

Sow the seed potato, furrowed in 60 to 75 cm (24-30 in) width, in the distance of 20 to 25 cm (8-10 in) between each piece, 10 cm (4 in) deep or

deeper, and with the cutting area facing down. Sprouts appear 20 to 30 days after sowing. To harvest big potatoes, it is recommended to leave about two sprouts only and remove the rest. Flower picking in the flowering season also helps generate big potatoes. Potatoes are harvested around Summer Solstice when the stems and leaves wither. It is recommended to dry the harvested potatoes in shade for 3 days and store them in a well-ventilated box in shade.

Medical Uses

In Germany and Russia, potatoes are served as main dishes, but potatoes are usually used for side dish such as salad, fried food, Sujebi or soy sauce boiled food. They are also used as ingredients of processed food, including starch, taffy, ethyl alcohol, and starch vermicelli. Potatoes consist of 70% water, 13 to 20% starch, 1.5 to 2.6% protein, 0.2% reducing sugar and 0.6 to 1% ash. Amino acid occupies half of the nitrogen compounds and potatoes have considerably more essential amino acid than flour.

According to "Dictionary of Oriental Medicines," potatoes are described as follows: "They have a sweet taste and plain properties. They protect body energy and strengthen the spleen and the stomach meridians. Potatoes contain solanine, a strong toxic component, but when a small amount of solanine is taken, it improves the heart functions, prevents inflammation and strengthens hematopoiesis functions. It is used in the treatment of gastritis, gastric and duodenal ulcer, burns and parotiditis. Extract juice by pounding potatoes and take 50 ml twice a day, morning and evening, before meals. Boiled potatoes are edible, too. For external medicines,

apply the juice extract or the combination of juice extract with vinegar to the affected area.
Glycoalkaloids are extracted from the flowers and sprouts and used to prevent and treat leukopenia, allergic diseases, and rheumatoid arthritis. Take 0.01 to 0.02 g at once a day or 0.03 g at once every other day."

Solanine, a toxic component contained in potatoes, is found in higher concentration in the leaves, stems, and sprouts, than the tubers. Tuber peels and buds also have high contents of solanine. When the tubers are left in sunlight, they turn blue, which indicates increase in solanine content. Blue tubers have toxicity and may cause gastroenteric troubles and food poisoning. Cut off the sprout from the potato or avoid eating the potato that turned blue.

Overdose of solanine may cause nausea, diarrhea, vomiting, stomach cramp, arrhythmia, and paralysis, leading to death in the worst case. According to researches, lethal does is 3 to 6 mg per 1 kg of body weight. Solanine is also contained in other Solanaceae plants, such as Black Nightshade or tomatoes. Solanine has disinfection and anti-insect effects as it is produced to protect themselves from insects, pathogenic bacteria or predators. Solanine itself is hardly soluble in water, but solanine hydrochloride, dissolving well in water, is used as an agricultural pesticide.

In organic agriculture, potato leaves and stems or the peels left after cooking can be extracted for fresh juice or decocted with water for a natural pesticide and disinfection agent.

Madagascar periwinkle

Madagascar periwinkle has been cultivated for a long time, not only for ornamental purposes but also for treatment of diabetes, malignant lymphoma, and leukemia. In summer, the whole plant is collected and dried for medical uses.

Madagascar periwinkle (Vinca rosea, Catharanthus roseus) is an annual plant in the family Apocynaceae, native to Madagascar, Java Island, and Brazil. In Korea, it is usually cultivated as an ornamental gardening plant. In the native tropical regions, the plant is an evergreen subshrub or a perennial plant. However they cannot tolerate the winter in temperate regions. The plant grows to 30 to 60 cm (12-24 in) tall and the leaves are long-elliptical, blunt-tipped, and arranged in opposite pairs. They are glossy, plain at margin and with a clear white midrib.

The flowers bloom in summer. The flowers are white to dark pink with a darker red center, with a corolla 3 cm (1.2 in) in diameter with five petals. One or two flowers continue to bloom and fall off from summer to autumn; the plant is called Madagascar periwinkle or Ililcho (one-day plant). The fruit has a pair of follicles, thin and long and split open vertically to let the dark seeds out.

Cultivation

Various kinds of garden varieties are at the market. The plant is used as cut flower. Recently, with cultivation of smaller species, 15 cm (6 in) tall, it is frequently used as gardening or potting plant. It is a perennial plant in the native tropical regions but it is an annual in Korea. Therefore, propagation is mostly made by seeds in Korea. Sow the seeds in March to April in greenhouses and in open fields after early May. Germination occurs in 17 to 25 days at 25°C (77°F). Sow the seed in a box for one temporary planting and permanently plant it in the garden or field. It is recommended to plant the species with the same color if possible.

Madagascar periwinkle likes sunlight. The plant is relatively drought-tolerant but it is better to water it once a day in summer. As the flowers continue to bloom from summer, once-a-month fertilization is recommended to supplement necessary nutrients. At maturity, the fruit splits open to let the seeds out. Pick up the fruit when it is ripe dark-brown and store the seeds in a paper bag for sowing in the next spring.

Medical Uses

Madagascar periwinkle has been cultivated for a long time, not only for ornamental purposes but also for treatment of diabetes, malignant lymphoma, and leukemia. In summer, the whole plant is collected and dried for medical uses. More than 60 kinds of medical compounds, including vindoline, were extracted from the Madagascar periwinkle, and they are commonly designated as Vincaalkaloid. Among them, Vincristine and Vinblastine have functions of restraining cancer cell division and preventing excessive increase in white blood

cells. Therefore, they are used in combination with other anti-cancer medicines in the treatment of acute leukemia, Hodgkin's disease, lymphosarcoma, reticulum cell-granuloma, neuroblastoma, rhabdomyoblastoma, wilm's tumor, testis cancer, Kaposi's sarcoma, and X-cell histiocytosis. The reported side effects are peripheral neuropathy, hyponatremia, constipation, and alopecia.

Madagascar periwinkle does not contain lethal poison. However, excessive ingestion may cause vomiting and general paralysis, drastic decrease in white blood cells, drop in blood pressure, and descent in blood glucose. Take caution when using the plant. No case is found of Madagascar periwinkle being used as natural pesticide. However, as it is a toxic plant containing a large amount of alkaloids, the plant can be extracted for fresh juice or infused in water or ethyl alcohol, based on the instructions applied to the oleander.

Cinnamon

Cinnamon oil has anti-insect effects against mites or house insects and restrains skin germs and white candida. It is also very effective for exterminating mosquito larvae.

Cinnamon is the common name designated to the dried stems and barks of the genus Cinnamomum. Saigon cinnamon (Cinnamomum loureirii), indigenous to mainland Southeast Asia, such as Vietnam. It was introduced to Korea through China and cultivated in Jeju Island. Similar trees of Saigon cinnamon, including C. cassia, C. verum, and C. burmannii, are also used as the major ingredients of cinnamon. Saigon cinnamon, mainly produced in Vietnam, has strong scent and contains the highest content of cinnamic aldehyde, one of the major ingredients of cinnamon oil, commanding the highest price in the mar-

ket. Saigon cinnamon is an evergreen tall tree in the family Laurales, growing to 8 m (26 ft), with hairless small stems. The leaves are 10 to 12 cm (4-4.8 in) long and ovoid. They have acute tips and plain margin with clearly marked 3 veins under the leaf. The greenish yellow flowers are borne in umbel at the leaf axil of new stems in May to June. The calyx is tubular and the top is 6-lobed. Stamens are arranged in groups of three in four rows and the inner most row does not have the anther. The fruits are elliptical and ripen black in December, 1.5 cm (0.6 in) long and 8 mm (0.3 in) wide. The stems and leaves produce cinnamon scent.

Cultivation

Saigon cinnamon or C. cassia (sometimes called Chinese cinnamon), compared to C. verum in the Ceylon region, India, known as "true cinnamon," has thicker bark and more astringent taste. Southern European people prefer Saigon cinnamon to Ceylon cinnamon, but it is sold as a plain cinnamon powder in North America regardless of the species. The bark peeled from the stems and branches is tightly curled while drying.

The thin bark is bright red brown while the thick one looks gray. The powder is reddish brown. Chinese cinnamon, compared to Saigon cinnamon or True cinna-

mon, is less aromatic. Saigon cinnamon has excellent aroma. Saigon cinnamon is a tropical plant and is cultivated in Jeju Island in case of Korea. It is recommended to shade the light during the period of young seedling, as the plant prefers partially shady areas. However, when the seedlings mature, plenty of sunlight produces more and higher-quality cinnamon oil. Propagation is made by seed or by cutting. For seeding, collect the mature fruits in early December; sow the seeds immediately after removing the pericarp. For cutting, cut the shoot, 15 to 17 cm (6-7 in) (4 to 5 nodes) long in late March to early April, remove the lower leaves and cut 4/5 of the remaining 3 to 4 leaves before planting.

Medical Uses

Cinnamon is one of the world's top 3 spices, along with black pepper and dried clove. It has been widely used as spice for foods, cookies, and beverages since very long ago. In oriental medicine, cinnamon is the second most frequently used medical herb among 293 herbs.

According to "Donguibogam (Eastern Medical Manual)," cinnamon is described as following: "It has very hot properties and a sweet and spicy taste with a little bit of toxicity. It warms up the internal organs, improves circulation in blood vessels, levels up the liver and lung energies, and treats cramping caused by intestinal convulsion. Cinnamon can cause miscarriage by spreading virtues of various medicines, without generating side effects. Scrape out the scale-like bark to get the pungent cinnamon core in the next layer. The cinnamon core treats 9 kinds of heartburn and kills 3 kinds of roundworm. It helps improve circulation of extravasated blood, stop cold sensation and abdominal pains, and eliminate all kinds of energy that causes stroke. It helps to overcome fatigue of the 5 viscera, improve 7 symptoms of poor stamina and enhance energy circulation in 9 holes of the body, thereby promoting smooth joint movement. It helps health of mind, brightens eyes, warms up waist, and keens and removes

body numbness. In addition, it soothes lump in flank and abdominal areas, improves circulation of extravasated blood, connects tendons and bones, revives flesh, and helps let out the placenta." Pregnant women and bleeding patients should take cautions in using cinnamon.

Cinnamon oil contains cinnamic aldehyde, camphene, cineol, linalool, and eugenol. Cinnamon oil has anti-insect effects against mites or house insects and restrains skin germs and white candida. It is also very effective for exterminating mosquito larvae. The results of a domestic research indicates that cinnamon oil, among 11 kinds of vegetable oil, has the most effective anti-fungal effects on vegetable pathogenic bacteria. In this regard, development of biological pesticides using cinnamon oil is under development.

In organic agriculture, cinnamon is decocted with water or infused in alcohol for simple use in farming.

Clove

About 15 to 20% of dried flower buds is essential oil. Major ingredient of essential oil is eugenol which produces the clove oil aroma. It prevents putrefaction and has anesthetic and disinfection effects.

Clove (Syzygium aromaticum) is an evergreen shrub in the family Myrtoideae, native to the Maluku islands in Indonesia. The plant is not cultivated in Korea. Cloves usually grow to 4 to 7 m (13-23 ft) tall and some of them over 10 m (33 ft). Cloves are different from Manchurian lilac (Syringa velutina) in the family Oleaceae, commonly grown in Korea. Cloves are cultivated throughout the tropical regions to obtain the clove spice. 90% of the world's production comes from Tanzanian Zanzibar Island and Pemba Island

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in the east coast of Africa.

The white flowers are arranged in cluster at the end of twigs. The calyx tube is red. To use the clove as spice, collect the clove before the flower buds split open and dry it in sun or on a fire. The shape of flower buds looks like a nail; hence called "Jeonghyang," where Chinese letter Jeong (丁) resembles the shape of the nail. English name "clove" also has a root which means nail. There is a record that cloves were introduced to China, Egypt, and Rome in B.C.E., where they were widely used as spice, tonic and preservative. Cloves were widely distributed to Europe by Portuguese and Netherland ships from the sixteenth century.

Cultivation

Cloves grow well in rich loamy soil in the humid tropical regions. They do not like places with strong sunlight in summer or with strong wind. Preferred

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habitat is partially shaded areas. Collect the ripe seeds and sow them as immediately as possible. Plant 18 to 24-month-old seedlings permanently in the distance of 6 to 7 m (20-23 ft) during the rainy season of June to July. Cloves can be harvested from 7 to 8 years later. The flower buds start appearing in August to September, and grow to less than 2 cm (0.8 in) turning pink in December to January, which is the best time for harvest. The flowers with split petals are not worthy as spice.

Cloves are not produced in Korea, and dependent on import for the entire amount consumed. Purchase is available via the internet, from herbal shops or spice stores. It is possible that alien substances, such as twigs or calyxes, can be included in the clove powder, in addition to the flower buds. It is recommended to purchase cloves in the form of flower buds.

Medical Uses

Cloves are one of the most widely used spices, along with black pepper and cinnamon. They are used for deserts, beverages, meat, pickles, Worcester sauce, and beef stock. Cloves have good aroma and excellent anti-decay and disinfection properties.

The extracted clove oil is volatile and widely used as medicines, antimicrobial agents (in particular, by a dentist), microscope lens rinsing agents, anthelmintic, gargling agents, toothpaste abrasives, soap, perfume, and hair oil.

According to "Donguibogam (Eastern Medical Manual)," cloves are described as the followings: "It has warm properties and a spicy taste with no toxicity. It warms up the spleen and stomach and treats pains in the abdomen and the scrotum caused by intestinal convulsions, poor kidney functions, sudden surging energy in the torso, and cold energy. It also improves sexual functions, warms up the waist and knees, treats stomach cancer, removes alcohol and wind poisonings, and cures several kinds of furuncles. It also treats Riggs' disease and produces various aromas."

About 15 to 20% of dried flower buds is essential oil. Major ingredient of essential oil is eugenol (72-90%) which produces the clove oil aroma. Clove oil also contains acetyl eugenol, beta-caryophyllene, and vanillin. About 150 ml of eugenol is produced from 1 kg of the dried flower buds. Eugenol is known to prevent putrefaction and has anesthetic and disinfection effects.

In organic agriculture, cloves can be used as a natural pesticide by infusing in water or alcohol. There are reported success cases in controlling diseases and insect pests such as root knot nematode and Pythium ultimum.

Japanese Pepper

Characterized by a spicy taste and astringent scent, Japanese pepper is used when making Kimchi or Chueotang (pond loach soup). With its hot properties, Japanese pepper warms up internal organs, improves the stamina, and enhances digestion. In oriental medicine, it is used for as stomach improvement medicines, anthelmintics, and inflammation treatment.

Japanese pepper (Zanthoxylum piperitum) is a small deciduous tree in the family Rutaceae, mostly grown at mountainsides and ravines in the warm southern regions. In some regions, it is called a "Jepi" tree.

The plant is 3 m (10 ft) tall at maturity. A pair of sharp thorns transformed from the stipules is arranged under the petiole and the branch has odd-pinnately compound leaves, alternate arranged. The ovate leaflets have yellow-green

patterns and blunt serrated margins under which the gland spots exist generating a unique aroma.

The yellowish green flowers bloom from May to June. The female flowers and the male flowers are borne in different trees, respectively, and arranged on the leaf axil in a corymb. The calyx is 5-lobed, and the male flowers have 5 stamens and the female flowers have fallen ovary and 2 styles. Red fruits are produced in September and split open at maturity. Black seeds are inside. Another tree resembling Japanese pepper is Chinese pepper tree. Chinese pepper trees are cultivated in all parts of the country. Their thorns are alternately arranged and the leaflets are small-serrated with transparent oil spots, which distinguishes them from Japanese pepper.

Cultivation

Its preferred habitat is the mountains and fields at an elevation of less than 800 m (260 ft) with the lowest temperature not dropping below -20°C (-4°F). Propagation is made by cutting, grafting, or seeds. In the case of seeding, germination rate is low because of the seed's dormancy. In general, the seeds are germinated in the second year, which makes it difficult to achieve mass-proliferation. If you rinse the fat contained in the seeds sufficiently with a dish washing detergent and bury them in the open field for about 5 months, germination rate can increase up to 70%.

For cutting or grafting, Japanese pepper variety without thorns is mostly used because of ease of management and harvest.

For grafting, perform notch grafting and bud grafting on the one-year-old seedling using a support wood. For cutting, use the new bud produced in the current year in early July. Habilitating plants stop growing before they are sufficiently lignified so keep them warm during winter. Plant the seedlings in spring to avoid frost damage.

Plant the seedlings in the distance of 2x2 m (7x7 ft). As the male and female trees are different, mix the male trees by 10% for pollination. In addition, maintain the tree height at 2 to 3 m (7-10 ft) for easy harvest. Harvesting is possible after 2 to 3 years and economic producing period of the Japanese pepper is about 10 years. For best quality, collect fresh fruits in ten days from mid-May to early June. Harvest the fruits when the seed coat is pinkish, splits half-open and the seeds turn black.

Medical Uses

Young leaves are edible as vegetable dish or pickled in soy sauce. The fruits and the fruit skin are used as medicines or spices. With its spicy taste and astringent scent, the plant is also used for cooking Chueotang (pond loach stew) or making Kimchi. In rural areas, People used to plant the Japanese pepper around the yard to repel mosquitos, or pound the Japanese pepper's bark with rocks and release it to the stream to catch fish. With its hot properties, Japanese pepper warms up internal organs, improves the stamina and enhances digestion. In oriental medicine, it is used as stomach improvement medicines, anthelmintic, and inflammation treatment.

According to "Constituents and Medical Uses of Herbs," "The fruit

skin contains 2 to 4% of essential oil. The major ingredients include dipentene (dl-limonene), citronellal, l-β-phellandrene (isomer of limonene), geraniol, and citronellol. In addition, 5 to 8% of sansol I and II are contained for pungent taste substances. Sansol Iis the compound of α-sansol and β-sansol, and has stronger pungent taste than sansol II (β-sansol). The fruits have xanthoxin, a convulsivant, and xanthoxin acid, sterolo campesterol, stigmasterol and β-sitosterol, a paralyzing ingredient.

The pungent taste substances contained in the fruits cause local paralysis. The fruits exterminate swine large roundworm in the test tube. In addition, the plant has antifungal effects against various pathogenic bacteria. Recently, it was reported that unsaturated fatty acid amid compounds have anti-insect and anthelmintic effects. This clearly indicates that the anthelmintic component of the Japanese pepper fruit is derived from the pungent taste substance."

In organic agriculture, Japanese pepper trees are planted around the field or the orchard to repel pests, or the leaves or the fruits are decocted with water or infused in alcohol for controlling insects or bacteria.

Hylomecon

The young plant is sometimes served as a vegetable dish, but caution should be taken as the plant has strong toxicity. In oriental medicine, the root of Hylomecon is called “Hacheonghwageun” and is used in the treatment of rheumatoid arthritis, weakness and fatigue, and contusion.

Hylomecon vernale and coreanomecon Hylomecon hylomeconoides are perennial plants in the family Papaveraceae, resembling each other. Both of them grow in forests; Hylomecon vernale mostly grows in the central-to-north-

ern regions, while Hylomecon hylomeconoides in the southern regions. The rootstock is short and thick and the leaves grow in group from the rootstock, reaching 30 cm (12 in). When injured, the plant exudes the yellowish red latex. The leaves are pinnate compound and the leaflet is wide-ovate, with irregularly and deeply serrated margins.

The hermaphrodite flowers bloom in April to May and 1 to 3 yellow flowers are borne from the upper leaf axil in umbel. Hylomecon hylomeconoides blooms in May to July, and single or clustering yellow flowers are borne at the end of the peduncle. The fruits are capsular, ripen in July, narrow- cylindrical, 3 to 5 cm (1.2-2 in) long and contain abundant seeds. The flower stalk of the Hylomecon vernale grows from the leaf axil, while the flower stalk of Hylomecon

hylomeconoides grows from the root. Hylomecon hylomeconoides also has considerably large end leaflets on the pinnate compound leaf.

Cultivation

The plant grows in group in well-moist mountain areas, under the trees or grasslands near the valley. Propagation is made by seed or division of suckering. The plant likes rich fertile soil. Add a lot of leaf mold. In case of transplanting, shade the plant about one week and then grow it in partial-shade. Too much nitrogen fertilizers may get the root obese and kill the plant. It is also important to avoid dryness.

Medical Uses

The young plant is sometimes served as a vegetable dish, but caution should be taken as the plant has strong toxicity. In oriental medicine, the root of Hy-

lomecon is called “Hacheonghwageun” and is used in the treatment of rheumatoid arthritis, weakness and fatigue, and contusion.

The toxic components contained in the plant include cryptopine, protopine, and chelidonine, similar to alkaloids contained in the greater celandine in the same family Papaveraceae. The toxic components are contained in the entire plant, but the root is found in particularly high concentrations. When the leaves or stems are injured, the plant exudes orange latex which also contains a large amount of toxic components. The major poisoning symptoms include drunken sensations, severe vomiting and respiratory paralysis, leading to death.

In organic agriculture, extract fresh juice from the plant or infuse in water or ethyl alcohol, as described in the Greater Celandine chapter.

African Marigold and French Marigold

A strong musk-like scent is produced from the whole plant. This scent is known to repel pests and nematodes. For that reason, marigold is sometimes planted along with other crops, such as tomato, eggplant, bell pepper, tobacco or potato.

African marigold or French marigold is an annual plant in the family Asteraceae, commonly called "Marigold," native to Mexico, southwest US and South America, widely cultivated as gardening plants throughout the world.

Marigold (Tagetes erecta) is also called African marigold. It grows to 50 to 100 cm (20-40 in) tall and the stems are divided into several parts and have no hairs. The leaves are pinnate compound and consist of 13 to 15 leaflets. The

leaflet is lanceolate with slightly serrated but flat looking margins. A unique scent is produced from the gland spot at the end of the side vein.

In summer, the branch produces thick stems from which the capitulum, 5 m (16 ft) in diameter, is borne. Depending on the species, flower as big as 10 cm (4 in) is borne. Plant cultivated in greenhouse produces flowers in May. Most of the flowers are yellow and stay in blossom for a long time. The petal looks like a rooster comb and forms an attractive ball-shape in full blossom. The fruit is an achene, long and thin, and with thorn-like pappus at the end.

French marigold (Tagetes patula) grows to 20 to 40 cm (8-16 in) tall, and has smaller flowers, 3 to 4 cm (1.2-1.6 in) in size, than the marigold. The flower colors range from yellow-brown to red-brown in variety, and their petals are less crooked than the marigold and hemisphere-shaped.

Cultivation

Both the marigold and the French marigold are cultivated as garden plants. Marigold is also used for the cutting. Plant the marigold in April to May permanently for ornamentation before the summer rainy season. If you cut the above ground part prior to the rainy season, you can keep the plant for ornamentation after the rainy season until the frosting season in autumn. Marigold is very intolerant to cold; when the temperature drops below 5°C (41°F), the growth stops and at below 0°C (32°F), the plant freezes to death. Propagation is made by seeding. Germination is done 4 to 6 days after seeding.

The seedling period is determined in consideration with the permanent gardening time in February and June. When the seeding is made in heated greenhouse around February, transplantation can be made into the pot in March to April and permanent planting can be done in early May in the flowering season. As the seeds are light-germinated, cover the seeds with shallow soil. In the rainy season with the temperature of 30°C (86°F) or higher, the plant may suffer from damping-off disease or wither away. Cut the above-the-ground plant for effective ventilation or cultivate the garden on a slope to reduce the damages.

Medical Uses

Marigold and the French marigold have been used as gardening plants or ornamental flowers in various ceremonies. They are also frequently used as dying and spicing materials. In the past, they were used in the treatment of gastric pains, vomiting, dyspepsia and toothaches, and for exterminating parasites.

A strong musk-like scent is produced from the whole plant. This scent is known to repel pest insects and nematode. Therefore, the marigold is sometimes planted along with other crops, such as tomato, eggplant, bell pepper, tobacco or potato. The secretion coming from the root exterminates nematodes and repels pest insects, such as white flies.

According to researches, thiophene, a natural plant component that has sulfur in the ring, plays an important part in controlling insects. Today, marigold is sometimes cultivated to extract lutein which obtained E161b as food additive. Lutein is a kind of natural pigments in the carotenoids system. It brings out yellow or orange color. As it acts as an antioxidant in the body, it is frequently used as food additive for healthy or functional food. The marigold oil extract is also effective for treating candidiasis caused by fungus and diseases on plants.

In organic agriculture, marigold or French marigold is planted with other crops to repel insects. Extract fresh juice from the plant or infuse it in water or alcohol for controlling insect and virus as a natural pesticide.

Crown Wood Fern

For medical uses, dig out the rootstock in spring and autumn and remove the fibrous root and excessive dirt. Rinse it thoroughly with water and dry it in sunlight. The plant has anthelmintic, antivirus, and antimicrobial effects. It is also effective in reducing fever and stopping bleeding.

Crown Wood Fern (Dryopteris crassirhizoma NAKAI) is a perennial plant in the family Dryopteridaceae, growing in group in shady, moist and deep ravines throughout the country. It grows in Korea, as well as Japan, China and Sakhalin. The rootstock is a thick stout, 8 to 10 mm (0.4 in) in diameter, ascending obliquely and grows to 25 cm (10 in). The leaves come out in a whorl, following the rootstock.

The leaves are 50 to 100 cm (20-40 in) tall and 2-pinnate deeply. The leaf lobe is 20 to 30 pairs, linear-lanceolate with an acute tip. The petiole and the central leaf vein are densely covered with brown scale. The sporangia containing spores is arranged in two lines near the central vein of the leaf lobe located at the upper leaf blade.

The indusium is round-kidney shaped with plain margins. At maturity, the sporangia splits open irregularly.

Cultivation

Its preferred habitat is moist area with high precipitation in partial-shade. The plant grows well in well-drained humus rich gritty soil with high water holding capacity. If the plant is transplanted from its natural habitat during its dormant period (mid-November or next March), the root is easily seated. However, the crown wood fern is currently designated as a protected plant. Therefore, it is desirable to make propagation by spores.

The following is the spore propagation method, taking the Osmond as an example: cover the spores with the peat moss as culture medium in the nursery box. Place it in the vinyl house and maintain 95% of humidity and temperature of 23±3°C in 70% shaded light. The prothallium germinates about 1 month later and the sporophyte is formed 6 months later. Permanently plant the seedlings when 3 to 4 main leaves are produces. It is recommended to do the permanent planting in mid-November or next March for good growth and rooting.

Medical Uses

The young shoots are boiled and dried and served as a vegetable dish. For medical use, dig out the rootstock in spring and autumn and remove the fibrous root and excessive dirt. Rinse it thoroughly with water and dry it in sunlight. The rootstock of the closely related plants in the same genus, including Athyrium brevifrons, Athyrium pycnosorum, Matteuccia struthiopteris, Woodwardia japonica, and osmunda japonica, are all considered as wood fern and used as medicines. It has anti-insect, anti-virus, and antimicrobial effects. It is also used to reduce fever and stop bleeding.

The major ingredient of the rootstock is filmaron. Filmaron is a kind of complicated phloroglucinol derivative. It is unstable and decomposes slowly to generate aspidin and albaspidin. The filmaron also contains aspidinol, flavaspidic acid, and filicinic acid. The phloroglucinol derivatives act as a toxic component in the central nervous system, skeletal muscles, and heart. A large

amount of the filmaron causes convulsion and paralysis on the central nervous system and the heart. When ingested, stomach mucous membrane is irritated, generating inflammations.

The phloroglucinol derivatives and their degradation product is protoplasm poison. In particular, strong toxic actions are found in muscle cells of the annelids and the mollusks. Therefore, anti-insect action of the crown wood fern is to paralyze the muscle and the nervous system of parasites. In addition, it is confirmed that the crown wood fern has strong restraining effects against the influenza virus and dermatophyte. However, overdose may cause diarrhea, hematuria, unconsciousness or convulsion and even blindness.

In organic agriculture, the rootstock is decocted with water or infused in water or ethyl alcohol for a natural pesticide.

Veratrum

Veratrum is a poisonous plant with strong toxicity. It causes vomiting or kills parasites. In spring, accidents are often reported of people vomiting or even dying from consuming veratrum confusing the shoots of Veratrum with long-root onion, day lily or purple plantain lily.

The genus Veratrum that belongs to the family Liliaceae, is distributed in Korea, as well as Japan and Manchuria. Veratrum oxysepalum (Veratrum oxysepalum Turcz.) usually grows in group in wetlands in remote mountains and shade areas under clumps. The rootstock is short and thick. The stems are erect, grow over 1 m (3.3 ft) and empty inside. The wide ovate leaves, 30 cm (12 in) long and 20 cm (8 in) wide, are arranged alternately. The leaves have the lined

veins and the leaf sheath wraps the stem. In July to August, the dark yellow flowers are borne in panicle at the end of the stem. The flowers are 2.5 cm (1 in) wide and unisexual. There are 6 petals and stamens, respectively and 3 stigmas. The fruits are capsular and divided into three.

Veratrum maackii (V. maackii var. japonicum) is similar to Veratrum oxysepalum, but their leaves are narrow (3 to 5 cm or 1.2-2 in wide) and they grow to 40 to 60 cm (16-24 in). Veratrum maackii grows under trees in mountains or meadows. The leaves are 20 to 35 cm (8-14 in) long, narrow willow leaf-shaped, arranged by wrapping each other, and gradually narrowed upward to the linear form. The bottom of the stem is wrapped by dark brown fibers. In July to August, the purple-brown flowers are borne in panicle. The male flowers are borne in the lower area, while the hermaphrodite flowers are borne in the upper area. The flowers are 1 cm (0.4 in) in diameter. Various similar species include V. nigrum L., V. maximowiczii BAKER, V. maackii, and V. versicolor.

Cultivation

Propagation is made by seeds. In October, collect the seeds and immediately plant them in seed bed with full moist and partial shade. Division does not work very well. As the plant basically grows in high

mountains, it is very intolerant to hot summer. Therefore, it is recommended to cultivate the plant in well-ventilated, partially shaded places. In case of Veratrum oxysepalum, take extra cautions to avoid dryness. Sandy loamy soil is appropriate for the plant. Sufficient leaf mold is helpful.

Medical Uses

Veratrum is a poisonous plant with strong toxicity. It causes vomiting or kills parasites. In spring, accidents are often reported of people vomiting or even dying from consuming veratrum confusing the shoots of Veratrum with long-root onion, day lily or purple plantain lily. To use the plant as medicine, dig out the root in autumn and cut the stems. Rinse it with water and dry it. Veratrum oxysepalum root is called "white hellebore," and Veratrum maackii root is called "black hellebore."

Veratrum oxysepalum root contains various veratrin alkaloids including yerbine, veratramine, rubi yerbine, gigadenin, and ginacine. Veratrum maackii root also contains veratrin alkaloids, including neridin, rubi yerbine, puseudoyerbine, colchicine, veratridine, yerbine, veratroilgigadenin, germenin.

According to "Dictionary of Oriental Medicines," Veratrum oxysepalum root is described as follow-

ing: “It has a spicy taste and cold properties with toxicity. It acts on the lung, stomach, and liver meridians. It causes vomiting or kills parasties. In the pharmacological test, it was found that the root helps drop blood pressure. It is used as an external medicine in the treatment of scabies, leprosy, and smallpox. Powder the root and mix it with water and base for applying to the affected area. It is also used as an anthelmintic to kill flies, maggots, and mosquito larvae. In the past, Veratrum oxysepalum root was prepared to make internal medicines to treat myalgia caused by stroke, coughing, and shortness of breath caused by epilepsy and sputum and laryngitis, but these days, it is only used for external medicines.”

With regards to Veratrum maackii root, it says “in pharmacological test, it was found that the root-infused water helps drop the blood pressure, protect the liver and strengthen the gall bladder. In oriental medicine, Veratrum maackii root was used as a vomiting agent or a pain killer. However, due to strong toxicity, it is not frequently used as an internal medicine but as an external medicine for scabies or leprosy. These days, the blue Veratrum maackii-infused water is used in the treatment of infectious hepatitis and chronic hepatitis. It is also used as hypotensive agents. Take caution for the dose taken, as it has strong toxicity.”

With its anti-insect property, the root-infused water can be used to bathe domestic animals to exterminate parasitic insects on the skin, such as mites and flees. In Japan, it is also used as a natural insecticide for agriculture. Decoct the root with water or infuse it in water or ethyl alcohol for use.

Carpesium (Hakseul)

In oriental medicine, the leaves and the fruits are medicinal: the leaves are called “Cheonjeongmyeong” and the fruits are called “Hakseul.” They loosen phlegm, reduce fever, stop bleeding, neutralize poison, and kill parasites. In particular, the fruits have strong anti-insect effects and are used for stomach troubles caused by parasites.

Carpesium (Carpesium abrotanoides L.) is a perennial plant in the family Compositae. In the same genus Carpesium are Carpesium cernuum, Carpesium divaricatum, Carpesium glossophyllum, Carpesium macrocephalum, Carpesium rosulatum, etc. The plant grows at the forest rim or under the tree shade. It grows to 1 m (3.3 ft) and the abundant branches stretch long sideward. The entire plant is covered with fine hairs. The root looks like a sweet potato and is

very hard. The leaves are wide-elliptical or long-elliptical and the leaves under the stem are as large as the tobacco leaves. The leaves have winged-petiole, gradually narrowed upward and that disappears at the end and the margin is irregularly serrated.

In August to September, yellow flowers 6 to 8 mm in diameter are borne on the leaf axil without peduncles like a spike in capitulum. The bell-shaped capitulum consists of tiny flowers in cluster. No spores. The fruit is an achene, 3.5 mm long, with the beak-like small bumps at the tip, from which the mucus is secreted, making animals deliver the fruits to remote places. The leaves and the fruits have gland spots that produce unique scent.

Cultivation

Carpesium blooms in August to September and bears fruits in October to November. It is relatively cold-hardy. As its native habitats are mostly forest rim or under the tree shade, it is recommended to cultivate the plant in a place with

sunlight or partial-shade. Acidic or neutral, argillaceous soil with good moisture retention is preferred. Propagation is made by seeds. Sow the seeds immediately after collecting or in the early spring. Only just cover the seed with soil and do not allow the soil to dry out. When they are large enough to handle, prick the seedlings out into individual pots or their permanent position in the field. In the case of potting, it is recommended to grow them out in a cold frame for at least their first winter and divide them in spring.

Medical Uses

In early spring, the fresh sprouts are parboiled and served as a vegetable dish or as a vegetable wrap. In oriental medicine, the leaves and the fruits are medicinal: the leaves are called “Cheonjeongmyeong” and the fruits are called “Hakseul.” The leaves are collected in summer and dried out in shade and the fruits are collected in autumn and dried out in sunlight. Fruits contain lactone components (carpesia lactone and carabrone), glycerides (caproic acid,

palmitic acid, stearic acid, oleic acid and linolic acid), cerylalcohol, stigmasterol, and paraffin.

They loosen phlegm, reduce fever, stop bleeding, neutralize poisons, and kill parasites. The fresh juice taken from the leaves can be applied to insect bites and administered to sore throat as a medicine. In particular, the fruits have strong anti-insect effects and used for stomach troubles caused by parasites.

According to "Constituents and Medical Uses of Herbs," Carpesium is described as following: "The fruit decoction paralyzes roundworms within 30 minutes but it cannot exterminate them. The decoction has a very strong sterilization effect on tinea pedis bacilli. The carpesia lactone paralyzes the central nerves, that is, medulla oblongata and pars intercerebralis. The fruits are used to expel roundworms and tapeworms."

In organic agriculture, anti-insect effects of Carpesium can be used for a natural pesticide. Extract fresh juice from the whole plant or decoct or infuse the dried plant along with their fruits for use.

Lavender

Lavenders are known to have pain killing, tranquilization, anti-insect, and disinfection effects. They were added to water for bathing, and the dried flowers were placed in wardrobes or drawers to expel moths or other insects.

Lavender, in general, indicates Lavandula, a genus of 25 to 30 species of herb in the mint family, Lamiaceaea, native to the Mediterranean regions. The genus includes herbaceous perennial plants or small shrubs. The flower, leaves, and stems are covered in fine hairs. Oil glands, existing between the hairs, produce refreshing fragrance. The most well-known genus includes English Lavender(L. angustifolia), French Lavender(L. stoechas), Fringed Lavender(L. dentata), Egyptian Lavender(L. multifida), Spike Lavender(L. latifolia), Wooly Lavender(L. lanata), and hybrid species, such as Lavandin Lavender (angustifolia-latifolia) and Sweet Lavender(dentata-latifolia).

English Lavender grows to 1 to 2 m (3.3-7 ft) tall and the leaves are

2 to 6 cm (0.8-2.4 in) long and 4 to 6 mm (0.16-0.24 in) wide. The flowers are borne in 2 to 8 cm (0.8-3.1 in) spike in cluster. French Lavender grows to 30 to 100 cm (12-40 in) tall and the leaves are 1 to 4 cm (0.4-1.6 in) long, densely covered with gray hairs. A little bit big flowers, resembling a rabbit ear, are borne at the top of the spike. Fringed Lavender grows to 50 cm to 70 cm (20-28 in) tall and the branches grow in the form of candlesticks. The leaves are 1.5 to 4 cm (0.6-1.6 in) long, thick-lanceolate, long-elliptical, densely covered with green gray hairs and pinnately toothed. They are not cold-hardy but they produce flowers frequently. Sweet Lavender, a hybrid species, grows to 80 to 100 cm (31-40 in) tall. It is divided into two kinds: one with pinnately toothed leaves and the other without teeth.

Cultivation

Lavenders flourish best in not-so-fertile, dry, well-drained, sandy soils. For potting, place the crushed rocks with good air circulation at the bottom and

add granite soil mixed with leaf molds for planting. Lavenders like sunlight but hate high temperature and high humidity. As the rainy season usually begins after flowering, it is recommended to cut the floral axis as soon as possible and provide good air circulation for management. Lavenders are not cold-hardy. Therefore, it is better to move the plants inside in winter except for English Lavenders. Even for English Lavenders, it is safe for mulching the surroundings or wrapping the plants with non-woven fabrics.

Propagation is made by seeding or cutting. For seeding, it is very likely to produce hybrid species. Sowing is made after storing the seeds at low temperature for one week to one month, but the germination rate is low. Lavandin Lavenders do not bear seeds. Start the cutting when the new sprouts appear in spring. The root starts getting seated as early as in 2 weeks. When harvesting the flowers, cut the flowers including the stems in a sunny day before the flower

buds split open and dry them up in well-ventilated shade.

Medical Uses

Lavenders are cultivated to collect the lavender oil or for ornamental purposes. Lavender oil is mainly used for perfume and cosmetics ingredients and food spice. The lavender oil is also used for aroma therapy. Lavenders are known to have pain killing, tranquilization, anti-insect, and disinfection effects. Since ancient Rome, they were added to water for bathing, and their dried flowers were placed in wardrobes or drawers to expel moths or other insects.

The major ingredients of the lavender oil are linalool and linalyl acetate; α-pinene, limonene, 1,8-cineole, cis- and trans-ocimene, 3-octanone, camphor, caryophyllene, terpinen-4-ol and lavendulyl acetate are also included.

With its unique aroma and anti-insect, and disinfection effects, in organic agriculture, Lavenders can be used for a natural pesticide. Extract juice from the plants or infuse them in water or alcohol and mix them with other natural materials for use.

Lopseed

Grinded root or root extract was added to steamed rice to be used to kill flies; hence the name "Paripul" (pari is fly, pul is plant). The plant is also used in squat toilet to exterminate maggots.

Lopseed (Phryma leptostachya) is a poisonous perennial plant in the Phrymaceae family, growing in Korea, Japan, China, Himalayas, and East Siberia. It grows to 50 to 70 cm (20-28 in) tall, under the tree shade and forest rim of mountains or partially-shaded places in the field. The entire plant is covered in fine hairs, and the stems are erect and their upper nodes are remarkably thick. The leaves are arranged in opposite pairs, ovate, 7 to 9 cm (2.8-3.5 in) long and 4 to 7 cm (1.6-2.8 in) wide, with long petiole, densely haired on both sides, especially on the vein, and have serrated margins.

The light purple flowers are

borne in July to September at the end of the stem or branch in spike. The inflorescences, 10 to 20 cm (4-8 in) long, bear a number of lip-shaped flowers, arranged upward to sideward from the bottom. After the flowers fall, the seeds hang down against the stem. The calyx is two-lipped. The upper lip is long and 3-lobed and the lower lip is short and 2-lobed. The corolla splits in opposite direction to the calyx. The fruits ripen in October. The tip is hook-shaped, making it possible to attach to humans or animals for distance propagation.

Cultivation

It is not difficult to collect the plant as the lopseed is commonly grown under the tree shade and the forest rim of mountains. However, not much information is available regarding its culture. If you really want to cultivate the plant, relatively moist and fertile soils in partial-shade are suitable, considering

its natural habitats. Propagation is made by seeds. Collect the matured seeds in autumn and plant them immediately or in spring.

Medical Uses

The grinded root or the root extract is added to steamed rice to induce and kill flies; hence the name "Paripul" (Fly Plant). The plant was also added into squat toilets to exterminate maggots. The pounded root or entire plant can be applied to furuncles, scabies or insect bites to neutralize the poison. In folk medicine, the whole plant is used in the treatment of neural paralysis, nervous system disorder, and constipation.

The major toxic components contained in the lopseed root are leptostachyol acetate and phrymarolin ll. Such toxic components are sometimes used as pesticide composites, as they have insecticide effects of exterminating flies and mosquitos.

In organic agriculture, such insecticide effects can be used for a natural pesticide. Extract juice from the root or infuse it in water or alcohol for use.

Pinellia

It has long been used as a medicine to stop vomiting. It is used as antiemetic, tranquilizers, and expectorants. If administered with ginger, pinellia has high curative value with little adverse side effect.

Pinellia (Pinellia ternate) is a perennial plant in the Araceae family, growing in the field or hill of the central-to-southern regions of Korea and also in Japan and Manchuria. It grows to 15 to 30 cm (6-12 in) tall and one or two leaves grow from the tubers in the ground. The tubers are globular and 1 cm (0.4 in) in diameter. Leaves have long petiole and consist of 3 leaflets. The leaflets are ovate or elliptical with acute tip and plain margin. The bulbil hanging under the petiole drops and grows as a new individual.

The flowering season is May to July and the flower stalk, 6 to 7 cm (2.4-2.8 in) long, with cylindrical green bract, grows longer than the leaves. The yellowish white flowers are densely arranged in the inflores-

cence inside the bract. The male flowers are borne in the upper area and the female flowers are borne in the lower area. The tip of the inflorescence is bent, growing longer than the bract outward. In August to September, the ovate green fruits ripen. It is called "Banha" in Chinese characters because the flowers wilt in the peak of summer (ban means half, ha is summer; meaning it flowers only for half of summer). The two species that grow in Korea are Pinellia ternate and Pinellia tripartite.

Cultivation

Cultivation is available in all parts of the country as the plant grows and reproduces well. Grow the plant in places with sunlight. In the central-to-northern regions of Korea, cover the plant with straws or leaf mold in winter to prevent frost damages. In the southern regions, partially shade the plant in hot summer days. Propagation is made by tubers. The best time for planting is mid-to-late March in spring and October in autumn, but the planting period varies by the regions to prevent frost damages.

Plant the tubers in the distance of 10 to 30 cm (4-12 in) between furrows, 5 to 10 cm (2-4 in) between tubers, and 5 cm (2 in) deep. After permanent planting, cover the

planted area with straws to preserve soil moisture and increase soil temperature for faster germination. It can be harvested from 2 years later. Harvest the plant after the end of June when the leaves dry up yellow. Dig out the tubers in the ground and sift out the tubers using a sieve with 8 to 9 mm (0.3-0.35 in) holes. Use the big tubers as medicines and the small tubers as the seed bulbs. The seed bulbs can be left in the field or stored together to prevent freezing and planted in the next spring.

Medical Uses

To use Pinellia as medicine, dig out the tubers and rinse out the dust thoroughly. Peel the skin and dry up in sun or over weak fire.

The tubers contain 1% of ether-X, 0.003 to 0.013% of essential oil, β-sitosterol and its glycosides, choline (0.015%), triterpene compounds, glucuronic acid and its derivatives, asparaginic acid, arginine, ligin, ornithine, serine, glycine, alanine, citrulline, β-amino butter acid, soluble glycosides, glucose and rhamnose. Oil, 1.9% of ash (49% of magnesium and 15% of calcium), mucous membrane irritants similar to protoanemonin, volatile alkaloid, 0.002% of ephedrine are also included.

According to “Constituents and

Medical Uses of Herbs," "Pinellia has long been used as a medicine to stop vomiting. It is used as antiemetic, tranquilizers, and expectorants in the treatment of nausea (caused by water stagnating in the stomach), vomiting during pregnancy, central vomiting, uremic vomiting, coughing, dizziness, headache, palpitation, acute gastritis, throat infection and insomnia. When administered with ginger, Pinellia has high curative value with little adverse side effect. In a folk remedy, the juice extracted from the fresh tubers and ginger is administered for alopecia."

Pinellia is a poisonous plant and can be used for a natural pesticide in organic agriculture. Following the same instruction described in Cobra Lily, extract juice from the plant, decoct it with water or infuse it in alcohol for use.

Empress Tree

It grows fast and is light. It doesn't absorb moisture or get distorted. It doesn't burn easily or get destroyed by insects. It transfers sound effectively and is easy to process. The empress tree was used to make furniture, wooden rice chests or musical instruments, such as Geomungo (Korean traditional musical instrument).

It is a tall deciduous tree in the Paulowniaceae family. It grows to 15 to 20 m (50-70 ft) tall and is mainly planted around the villages. In Ulleung Island, empress trees grow spontaneously and they are also found in Japan and China.

The leaves are ovate, 3- to 5-lobed and arranged in opposite pairs. The lower area of the leaves is heart-shaped and 15 to 30 cm (6-12 in) long. Both the

front and back of the leaves are densely covered in hairs. The margin is plain and the petiole is long and covered with fine hairs.

The pale purple flowers are borne in panicle in May to June. The calyx is divided into 5 sepals, densely covered in brown hairs and attached to the small flower stalk. The corolla is funnel-like bell shaped. It is 5 to 6 cm (2-2.4 in) long, covered in glandular hairs on the surface and the purple dotted lines are found inside. The fruits are capsular, round, hairless, 3 to 4 cm (1.2-1.6 in) long and ripe in October.

Paulownia coreana, unlike the empress tree, does not have purple dotted lines inside of the corolla, and is almost hairless on the surface.

Cultivation

It is a fast growing tree and likes sun. It preferred habitats are well-drained, deep and fertile soils. Propagation is made by seeding and root cutting. Prevent damping off when seeding in spring and avoid direct contact with rain. As the seeds are very fine, extra caution should be taken when watering after seeding. In case of small cultivation or if you want to get prime quality plants, root cutting is recommended. For root cutting, cut the root 1 to 3 cm (0.4-1.2 in) in diameter by 10 to 15 cm (4-6 in) in length from the big tree in March to April and prick it on the cutting bed obliquely and cover with soils 2 to 3 cm (0.8-1.2 in) thick. You can get a big seedling in one year as it grows very fast.

Medical Uses

Empress tree grows so fast that you can cut and use the timbers in 15 to 20 years. It doesn't absorb moisture or get distorted. It doesn't burn easily or get destroyed by insects. As it transfers sound effectively and is easy to process, the empress tree was used to make furniture, wooden rice chests or musical instruments, such as Geomungo.

In oriental medicine, the empress tree is called "Baekdong" and its leaves, barks and fruits are used as medicines. The bark, called "Dongpi," has a bitter taste and cold properties and contains syringing components. Collect the bark all year round and dry it up in sunlight. The bark decoction or grinded bark is used in the treatment of hemorrhoid, venereal disease, erysipelas (inflammation caused by invasion of streptococcus to the wounds or scratches), and contusion.

The leaves, called "Dongyeop," contain ursolic acid, various glucoside and polyphenols components. They have a bitter taste and cold properties with no

toxicity. They are used as medicines to stop bleeding caused by large furuncles, several furuncles or cuts. The fruits, called "Podonggwa," are medicinal for coughing caused by chronic bronchitis, asthma, and excessive generation of sputum and phlegm.

In the past when there were no insecticides, the empress tree leaves were used to exterminate maggots in squatting toilets. In addition, the rice chest made by the empress tree was very popular as it was known to expel insects. In addition to such insecticide and insect-repelling effects, the phenylpropanoid glycosides (a kind of polyphenol) extracted from the royal foxglove tree is known to have anti-inflammatory and antibacterial effects.

In organic agriculture, the empress tree leaves are extracted for juice, decocted or infused to be used as anti-insect and antimicrobial agents.

Manchurian walnut and Persian walnut

Barks, roots, leaves, and immature fruit skin of the Manchurian walnut and the Persian walnut have anti-insect, disinfection, and bacterial restraint effects because of juglone and tannin components.

Manchurian walnut (Juglans mandshurica Maxim.) is a tall tree with fallen leaves, growing up to 20 m (70 ft) tall at maturity. They are mainly found in the mountain foot and valleys of the central-to-northern regions of Korea. The leaves are oddly-pinnate. The leaflet is 7 to 17 cm (2.8-6.8 in) long, long-elliptical or ovoid, with slightly serrated margins and glandular hairs on the vein of underleaf. The flowers are dioecious and borne in April; female flowers and male flowers are produced separately. Male flowers droop catkins 10 to 20 cm (4-8 in) long and female flowers are in spikes of 4 to 10. The pistil is red. The fruits are ovate and ripe in September. The seed has acute tip and is very hard.

Persian walnut (Juglans regia Dode) is a deciduous tall tree in the Juglandaceae family, native to Persia and China. Persian walnut trees have long been cultivated in the

central-to-southern regions of Korea. The leaves are oddly-pinnate and consist of 5 to 7 leaflets. The leaflet is elliptical, getting bigger upward and with dully or unclearly serrated margins. The flowers are dioecious and the male and the female flowers are produced in April to May separately in upper and lower areas. The male flowers are in drooping catkins 15 cm (6 in) long, and the female flowers are in spikes of 1 to 3. The pistil head is yellow. The round fruits are hairless and ripe in September to October. The inside of the seed is divided into 4 sections unlike the Manchurian walnut which is divided into 2 sections.

Cultivation

Manchurian walnut relatively grows fast and its preferred habitats are moist and fertile soils. It is cold-hardy but it doesn't grow well in warm climates. Propagation is made by seeds. Soak the seeds in running water for 4 to 5 days and mix them with wet sand in the proportion of 1:2. Store them in the open field 30 to 50 cm (12-20 in) deep in the ground and sow them next March to April.

Supply enough water during the winter season. Plant the seeds vertically and cover 4 to 5 cm (1.6-2 in) of soil and stomp the ground properly.

Persian walnut prefers well-drained, fertile soils with good air circulation in enough sun. In particular, sufficient fertilization will make the seedlings grow fast. Propagation is made by seeding or grafting. For seeding, collect the seed in late October, mix them with sand, and bury them in well-drained soil. Take out and plant the seeds in spring, same as Manchurian walnut. For grafting, use the Persian walnut or the Manchurian walnut as a support wood. Cut the completely dormant wood in late January to early February, and store them at the temperature of 10 to 11°C (50-51.8°F) avoiding dryness. Grafting is recommended in late May to early June.

Medical Uses

Fresh Manchurian walnut or oil extract are edible. Like walnut, Manchurian walnut strengthens the kidney and lung, stops coughing, and improves the memory. Young leaves are edible after parboiling. In oriental medicine, the dried bark or root skin collected in spring to autumn, called "Chumokpi," is used as medicine.

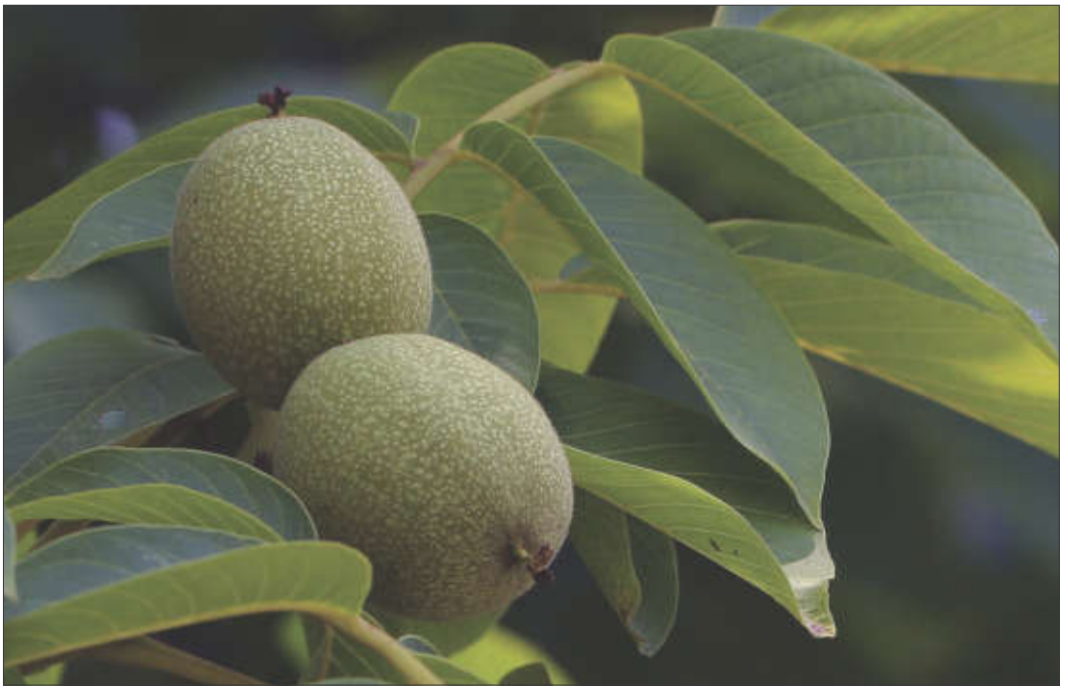
According to "Donguibogam (Eastern Medical Manual)," "Chumokpi" is described as following: "It has cold properties and bitter taste with no toxicity. It kills 3 parasites and skin germs. Make an ointment with the boiled/concentrated Chumokpi and administer it on leprosy, furuncles on the back, furuncles on the neck or armpit, carbuncles, and syphilitic ulcers on genitals to remove bloody pus and reproduce the flesh. It also strengthens tendons and bones."

According to "Grand Dictionary of Chinese Medicines," Persian walnut is described as: "The root is collected in September to October. It is effective for relieving chronic constipation, exterminating insects, neutralizing poison, strengthening energy and removing toothaches of senior people. The bark is used to kill parasites and treat diarrheal dysentery and eczema on scrotum and

itchiness of whole body. The leaves treat white leucorrhea, scabies and elephantiasis and they are also effective for exterminating insects and neutralizing poison."

The barks, roots, leaves, and immature fruit skin of the Manchurian walnut and the Persian walnut have anti-insect, disinfection and bacterial restraint effects because of the juglone and tannin components. Juglone and tannin are substances secreted by the tree to protect themselves from bacteria and insects. Juglone secreted from the root prevents growth of other plants, while producing disinfection and anti-insect effects. Tannin, with its strong astriction, makes it difficult for animals to digest the tree, producing antibacterial and anthelmintic effects.

In organic agriculture, such disinfection and anti-insect effects of Manchurian walnut and Persian walnut can be used for a natural pesticide. Extract juice from the bark, root, leaves or immature fruit skin or infuse it in water or alcohol for use.



Garden balsam

Quercetin and kaempferol, the major ingredients of the garden balsam, are strong antioxidants. When added to food, they can prevent spoilage caused by oxidation or generation of fungi. They also inhibit the proliferation of cancer cells. Naphthoquinone and its derivatives kill or restrain various bacteria.

Garden balsam (Impatiens balsamina L.) is an annual plant in the Balsaminaceae family, native to India and South East Asia. It is planted in various regions of Korea for ornamental purposes. It grows to 60 cm (24 in) tall at maturity. The stem is hairless and erect, and the node at the bottom of the stem particularly stands out. The leaves are spirally-arranged and lanceolate with nar-

row ends. They have the petiole and serrated edges.

In July to August, the pink, red, white or purple flowers are borne in group of 2 to 3 on the leaf axil, depending on the species. The flowers are tubular, supported by broad petal on the bottom with a slightly drooping honey sac at the back. There are 5 stamens and the anthers are inter-connected. The fruits are elliptical and covered in hairs. The ripe seed capsules undergo explosive dehiscence. Similar species include Impatiens textori. They grow around ravines or wetlands in group in all parts of Korea.

Cultivation

The plant can be cultivated anywhere in Korea. Its preferred habitats are loamy soils in enough sun but it also grows relatively well in poor environment. Propagation is made by seeds. When you plant the seeds in March to April, you can see the flowers in summer. If you plant the seeds in May to June, you can still see the flowers until late autumn. In case of using the seedlings, transplant them after sprouting and when 2 to 3 pieces of main leaves appear. Impatiens textori, usually prosper in partial-shade in wetlands. Propagation is made by seeding or cutting. If the planting area is not wetlands, it is recommended to supply sufficient water.

Medical Uses

In the past, the garden balsam flowers were pounded to die finger nails. The dried whole plant, flowers and seeds are used for medicinal purposes. In particular, the garden balsam seeds, called Geupseongja, are collected at maturity and dried in sun for use.

The flowers contain anthocyanin components (cyanidin, delphinidin, pelargonidin, and malvidin), kaempferol, quercetin, and naphthoquinone component. The seed oil contains a considerable amount of unsaturated fatty acid (parinaric acid). Balsaminasterol, saponin, and flavonoid components such as quercetin and kaempferol are also included.

According to "Constituents and Medical Uses of Herbs," the garden balsam is described as following: "The seed decoction acts on womb contraction and contraception (inhibitory action on ovulation and oxygen contraction). In the treatment of oriental medicines, the seeds are used for neutralizing poison and menstrual irregularity. The stem, called 'Tugolcho,' is used as pain killers, anti-inflammatory drugs, and hemagogue in the treatment of rheumatism, contusion and lung diseases. In folk remedy, people used to take the seeds with water when fish bone got stuck in the throat in belief that the seeds soften the bones. It was said that

the seeds should not contact the teeth. In addition, a couple of seeds added to boiling fish are known to soften fish bone. For digestive system cancers, decoct 30 to 60 g of seeds and take it. The flowers, leaves, and stem juice are administered on tinea pedis. Yellow Impatiens textori, also known to be effective for improving blood circulation, pain killing, and neutralizing poison, is used in the treatment of habitual arthralgia, menstrual pain, lymphadenopathy, and venomous snake bites."

Quercetin and kaempferol, the major ingredients of the garden balsam, are strong antioxidants. When added to food, they can prevent spoilage caused by oxidation or generation of fungi. They also inhibit the proliferation of cancer cells. Parinaric acid also restrains tumors. Naphthoquinone and its derivatives kill or restrain various bacteria. Therefore, it is used as ingredients for germicides and tinea pedis treatment agents.

In organic agriculture, garden balsam can be used for antibacterial agents and germicides. Extract juice from the whole plant or infuse it in water of alcohol for use.

Picrasma quassioides

The bark is as bitter as cow womb; hence the name “Sotae” (so is cow, tae is womb). It has a bitter taste and cold properties with toxicity. It reduces fever and dries up moisture. It improves stomach functions, kills parasites and neutralizes poison.

Picrasma quassioides is a deciduous tree in the Simaroubacceae family, rarely growing in ravines or the hillsides in enough sun and distributed in Japan, Taiwan, China, India and Himalayas. The bark is as bitter as the cow womb; hence the name “Sotae.” It grows erect to 10 to 12 m (33-40 ft) tall and the branches are laid horizontally. The bark is dark brown. The young tree has rhombus-shaped lenticel. The more aged the tree is, the more vertically furrowed the bark is. The winter bud does not have scales and is covered in red-

brown fine hairs.

The leaves are alternate and pinnate. 9 to 15 leaflets are ovate or long-elliptical, hairless on the surface, glossy and have wave-like coarsely serrated margins. Autumn leaves turn yellow. The flowers are dioecious and yellow-green flowers are borne in the centrifugal florescence from the leaf axil in May to June. The male flowers have 4 to 5 petals and 4 stamens. The pistil of the female flowers is divided into 4 sections. The fruits are oval and the calyx is attached as it is. They ripen dark-red in September.

Cultivation

The plant prefers sunlight but is not picky about soil. The plant lives with the Japanese Elm, Zelkova tree and red-leaved hornbeam and is very tolerant to cold and drought. It mostly grows in the ravines or hillsides.

Propagation is made by seeds. Collect the seeds in late September and remove the fruit flesh. Mix them with sand and store them in a cool place and plant them early in the next spring. When the seedlings grow, move them into

individual pots and let them stay there one winter before permanent planting in the next spring.

Medical Uses

The bark, the root skin or the xylem, called "Gosupi" (old bark) or "Gomok" (old wood), is used as medicines. It has a bitter taste and cold properties with toxicity. It reduces fever and dries up moisture. It improves stomach functions, kills parasites, and neutralizes poison.

According to "Grand Dictionary of Chinese Medicines," Picrasma quassioides: "contains quassin and picrasmin. In addition, it contains picrasin A to G, nigakihemiacetal A to C and nigakilactone A to F, H, J, K, M, N. Nigakinol, nigakinone and methyl nigakinone are also included. Other than those components, 4 kinds of crystal substances with no bitter taste, such as 2, 6-dmethoxy-P-benzoquinone, C28-30 H48-52O2, 4, 5-dimethoxycanthin-6-one, and 2, 4-dichloro-6-aminopyridine are also contained. The fruits and the nucleoli contain oil. Petroselinic acid, palmitic acid, oleic acid, linoleic acid,

linoleic acid and lauric acid are contained in their fatty acid."

According to "Dictionary of Oriental Medicines," Picrasma quassioides is described as following: "Cut the stem in autumn or spring and peel out the skin and divide it in even length and dry in sun. It has a bitter taste and cold properties. It reduces fever, eliminates moisture, neutralizes poison, and kills parasites. In experiments, it was found that quassin, the bitter component, improved stomach functions and the alkaloid nigakinon had anti-allergic actions. It is used as a bitter stomachic in the treatment of dyspepsia, gastritis, anorexia, infection of biliary tracts, ascariasis, scabies, eczema and burns. Take 5 to 12 g a day as a decoction. Overdose may lead to vomiting. For external medicinal use, rinse the affected are with the decocted water or apply the plant powder. Do not use it on pregnant women."

In organic agriculture, the bitter taste and anti-insect effects of Picrasma quassioides can be used for as natural pesticide. Decoct the plant with water or infuse it in water or ethyl alcohol for use.

Pomegranate

In oriental medicine, the fruit skin, called "Seokryupi," is used as medicine. It is effective for treating diarrhea and shigellosis. Rinsing mouth with pomegranate skin water can stop inflammation in the mouth, tonsillitis, and pains by dental caries. It is also used as anthelmintic.

Pomegranate (Punica granatum), native to Iran, Pakistan, Afghanistan, and the Mediterranean regions, was introduced to Korea through India and China. It is also found in the history of Shilla, an ancient Korean kingdom. The pomegranate is a deciduous tree growing 3 to 5 m (10-16 ft) tall and producing a lot of twigs from the stems. The stems are distorted and the twigs are square, hairless and with thorns at the tip. The leaves are in opposite pairs and long-elliptical. The leaves are narrow oblong, hairless, with plain margin and short petiole. In spring, the leaves are produced in the late April or the early May, later than other trees.

The flowers are monoecious and mostly borne red in May to July in 1 to 5 clusters at the end of the stem. The yellow, white or mixed

color flowers are also produced along with the fruitless double flowers for ornamental purposes. The calyx is tubular and divided into 6 sections. 6 petals are overlapped like roof tiles. There are abundant stamens and 1 pistil.

The fruits are round, 6 to 8 cm (2.4-3.1 in) in diameter, with the calyx piece attached to the end, and ripe brownish yellow or red in September to October. The skin is commonly exploded to expose the seeds inside. The thick fruit skin has 6 loculuses partitioned by the thin septum, in which numerous seeds, surrounded by red water-laden pulp are embedded.

Cultivation

Its preferred habitats are well-drained, deep, sandy gritty loamy soils. The pomegranate is intolerant to cold climates and does not show economic growth in the central regions. Therefore, it is mostly cultivated in the southern regions. The plant produces many flowers and good harvest in sunny places with little wind. It also grows well at the beach. It grows relatively fast but is likely to have many suckers near the root. Transplantation is easy.

Propagation is made by seeding, cutting, layerage or dividing suckers. Collect the seeds when the fruits turn red from yellow. In temperate regions, sow the seeds directly on the field. In cold regions, store the seeds in dry sand and sow them in spring. For cutting, cut hardwood in spring and softwood in summer. Rooting stimulant is helpful and effective. It is recommended to cut the branch growing near the root.

Medical Uses

There are pomegranates with strong sweet taste and strong sour taste. The juice contains 40% of glucose and fructose and 1.5% of citric acid producing sweet-sour taste. The seeds contain natural vegetable estrogen, known to be good for menopausal syndrome. The colorful juice is used to make fruit liquor or the juice concentrate is used to make beverages or snacks. The pomegranate flowers and the immature fruit skin are used as ingredients of red dye.

In oriental medicine, the fruit skin, called "Seokryupi," is used as medicine. It is effective for treating diarrhea and shigellosis. Rinsing mouth with pomegranate skin water can stop inflammation in the mouth, tonsillitis, and pains by dental caries. It is also used as anthelmintic. The stems, branches and root skin have even stronger effects. The ingredients contained include alkaloids, such as pelletierine and esopelletierine, known to generate poisoning symptoms such as the central nervous motor disturbance and respiratory paralysis. Such ingredients are mainly contained in the root and the stem skin; so the fruits are safe.

According to "Illustrated Book of Korean Medicinal Herb" written by Duk-

gyun An, the pomegranate fruit skin is described as following: “It has a sour, astringent taste and warm properties. It strengthens the intestine, stops diarrhea, and kills parasites. The sour and astringent taste goes to the large intestine and treats old diarrhea and shigellosis. For a single medicine, take the fruit skin decoction or burn it and take the powder. Take the decoction or powder when you have abdominal pains caused by parasites in the intestine. It effectively kills tapeworms. In vitro test, it is revealed that the fruit skin effectively restrains growth of yellow staphylococcus, streptococcus, Vibrio cholerae, dysentery bacillus, pseudomonas aeruginosa and tubercle bacillus. In addition, it also considerably restrains influenza and dermatophyte.”

According to “Dictionary of Oriental Medicines,” the pomegranate root skin is described as following: “Dig out the root in autumn. Rinse it with water, peel the skin and dry up in sun. It has a sour taste and warm properties. It acts on the large intestine. It kills dipylidium caninum and stops diarrhea. The pelletierine, an alkaloid ingredient, has anthelmintic actions, as well as antifungal effects. It is used in the treatment of taeniasis, ascariasis, diarrhea and shigellosis. Take 6 to 12g of decoction a day."

In organic agriculture, such anti-insect and bacterial restraint effects of the pomegranate can be used for natural pesticide. Decoct the fruit skin, stems or root skin or infuse it to use as a natural insecticide and germicide.

Common Cosmos

When you rub the cosmos leaves or stems and place them near the nose, you can smell its unique fragrance and scent. Common Cosmos, compared to other species in the Asteraceae family, contains a considerable amount of polyphenol and flavonoid content.

Common Cosmos (Cosmos bipinnatus) is an annual plant in the Asteraceae family, native to Mexico. It was known that Common Cosmos was first introduced to Korea in the 1910s. It grows to 1 to 2 m (3.3-7 ft). The branches are divided at the upper area and the entire plant is hairless. The leaves are in opposite pairs and divided in two-pinnate in the form of lines. In June to October, one capitulum (capitated flowers borne in small cluster without peduncle at the end of the floral axis) is borne at the end of the branches and stems, respectively.

The capitulum, 6 cm (2.4 in) in diameter, consists of 6 to 8 ray flowers and the yellow tubular flower. The ray flowers play the role of petals. The flowers are pale pink, white or red and the margin is lobated in the serrated form. The tubular flower indicates the bunch of yellow tubular flowers located in the center and the anther is dark brown. The fruit is an achene, hairless and with the beak-shaped tip. The similar species with the yellow flowers is called Yellow Cosmos (C. lutea).

Cultivation

Common Cosmos is an annual plant but planted once, the seeds drop in autumn and the new sprouts appear in the following year. So there is no need to plant the seeds every year. Cultivation is relatively easy, too. Its preferred habitats are relatively dry and poor soil with full sun. Fertile and moist soils may make the plant overgrow, resulting in falling-off. Cut off the buds or lay the buds sideward when they are young to reduce the height.

Plant the native seeds in late April to early May in general. Directly sow

them in the garden or in the seed box or pot and then transplant the seedlings later. The native cosmos is for short-day and the flowers only bloom in autumn when the day light shortens. On the other hand, the improved early maturing cosmos produces the flowers in 50 to 70 days after seeding, regardless of the length of day light. Therefore, you can plant the seeds by calculating back to the date you want the flowers to bloom.

Medical Uses

In oriental medicine, the whole plant except for the root, called Chuyoung, is used as medicines in the treatment of red eyes, eye pains and furuncles. In a Chinese book titled "Illustrated Book of Medicinal Herb," Chuyoung is described as followings:

"It has a bitter taste and cold properties. Collect it in July to August, dry it in sun and cut it. It reduces fever, neutralizes poison, brightens eyes, and treats furuncles. It treats bloodshot, swollen, and painful eyes. Decoct 9 to 15 g with water and take it. To treat skin furuncles, pound hard the plant and apply it to

the affected area or powder a proper amount of the dried plant and mix it with balm for application."

When you rub the cosmos leaves or stems and place them near the nose, you can smell its unique fragrance and scent. Common Cosmos, compared to other species in the Asteraceae family, contains a considerable amount of polyphenol and flavonoid content. These ingredients have anti-oxidation effects. The flavonoid is a yellow plant pigment. In addition to anti-oxidation effects, it also has antibacterial, anti-cancer, anti-virus, anti-allergic, and anti-inflammatory activities, and almost no toxicity.

No in-depth research has been made to find out the cosmos' inhibiting effects against insects and bacteria. However, Jadam had received several reports from farmers that the common cosmos repels stinkbugs (hemipteras). Jadam conducted a simple test. In an empty clear plastic bottle, minced common cosmos was placed on one end and about ten stinkbugs were pushed into the bottle. The stinkbugs would be driven into the opposite corner from the common cosmos. This test confirmed the repellant effect of cosmos.

You can plant common cosmos along with the crops that you are concerned about possible damages by stinkbugs to prevent their approach. You can extract fresh juice from the common cosmos or decoct or infuse the dried common cosmos to make natural pesticides.

Tea plant

A considerable amount of catechin, caffeine, and theanine are contained in the tea. Efficacy and taste of the tea is mostly determined by catechin and amino acids; catechin provides astringent and bitter taste while the amino acid, such as theanine, provides savory and sweet tastes.

Tea plant (Camellia sinensis) is an evergreen tree in the Theaceae family, native to China and found in tropical and subtropical regions such as Japan and India. The plant was first introduced into Korea in the period of the Three Kingdoms (over one thousand years ago) and are mostly grown in warm regions. The root stretches down directly to 2 to 4 m (7-13 ft) deep. The leaves are alternate, lanceolate, long-elliptical with bluntly serrated margins. The leaves are thick, glossy and hairless on both sides. The surface is green with the dented veins, and the under-leaf is gray with projected veins.

The white flowers are borne in October to November on the leaf axil or the end of the branch in 1 to 3 clusters. The flowers are 3 to 5 cm (1.2-2 in) in diameter and fragrant. The green calyx is divided into 5. 6 to 8 petals, is broad obovate and bent backward. 180 to 240 stamens are integrated at the bottom in the form of tube and the anthers are yellow. There are 1 pistil, 3 styles, densely covered in white hairs and 3 ovaries. The fruits are capsular and round-

angular. As the fruits ripen in the following autumn, the flowers and fruits are shown at the same time. When the fruits split open when ripen to expose hard brown seeds.

Cultivation

The preferred habitats of the tea plant is well-drained slightly acid soils in pH 4.5 to 5.5 with good air circulation, good moisture retention and good nutrient holding capacity at the average annual temperature of 14 to 16 °C (57.2-60.8°F). The ideal cultivation site to produce the best tea flavor is the shady forest in a sunny place with frequent fog at a slope in a valley. Too much sunshine develops fiber in the tea leaves, increasing the bitter and astringent taste. In such a case, it is recommended to shade the sun to increase the content of amino acid that determines the tea flavor.

Propagation is made by seeding or cutting. For seeding, collect the seeds in autumn and immediately sow them. Or store the seeds in a net in the open field or in the cold storage box at 5 °C (41°F) and sow them before the mid-March in the following year. Spot seeding is recommended; plant 2 to 3 seeds at

once, 5 cm (2 in) deep in case of autumn planting and 3 to 5 cm (1.2-2 in) deep in case of spring planting. For cutting, select the branch with sound lateral buds, hardened yellow-brown from the new branch in June to July and cut the branch in a way to have 3 nodes and 2 leaves and plant it 3 to 4 cm (1.2-1.6 in) deep. At this time, shade the sun by 60 to 80%. For purchased seedlings, neatly arrange the root and plant them in the mid-to-late March and cover the soil with straw or grass.

Medical Uses

Tea has long been loved by people. Tea flavor and scent varies depending on the period that the tea leaves are harvested, extent of fermentation period, and manufacturing methods. When classifying the tea by fermentation, the almost unfermented tea is called green tea. 10 to 70% fermented tea is called the partially fermented tea (pauchong tea, oolong tea). More than 80% fermented tea

is called fermented tea (hongcha, black tea). Such fermented tea is called the oxidized fermented tea. Re-fermenting oxidized fermented tea produces post-fermented tea or microorganism-fermented tea, which includes dark green tea and pu-er tea.

The major ingredients of the tea include free amino acids (catechin, caffeine, theanine), pigment components (chlorophyll, flavonol, anthocyan), lipid, resins, essential oil, vitamins, and minerals. Compared to other plants, tea contains a considerable amount of catechin, caffeine, and theanine.

Quality and taste of the tea is mostly determined by catechin and amino acids: catechin provides astringent and bitter taste while the amino acid, such as theanine provides savory and sweet tastes. Theanine is biosynthesized in the tea plant root and stored in the leaves. It is chemically decomposed by sunlight and transformed to catechin.

Catechin is a kind of polyphenol that belongs to flavonoids, and a major ingredient of astringent taste of green tea. The tea leaves contain free catechin producing a mild bitter taste, ester catechin producing a bitter and astringent taste and, and linked catechin producing strong bitter taste and light astringent taste. Unlike tannin in the persimmon, catechin is segregated from protein, and does not make the mouth unpleasant. Catechin has a lot of effects: anti-oxidation, anti-cancer, arteriosclerosis, restraint of blood pressure, prevention of blood clot, anti-virus, anti-obesity, anti-diabetes, antibacterial, poison neutralization, and anti-inflammation, prevention of cavities, prevention of thirst, and normalization of bacterial flora in the intestine.

Caffeine is a kind of alkaloid, contained in the fruits, leaves, and seeds of some plants, such as coffee and tea and has a bitter taste. It acts like an insecticide by paralyzing and killing plant-eating pests. When human consumes a proper amount of caffeine, it generally stimulates the central nervous system and the metabolism, thereby temporarily shaking off sleepiness, reducing fatigue, and awakening the brain. It also facilitates urination.

Theanine is a kind of amino acid, accounting for the highest content among the amino acids contained in tea. Theanine gives sweet flavor and relieves tension. Theanine, theophylline and catechin components in tea, when combined with caffeine, make caffeine insoluble or restrain its activity, therefore reducing side effects, such as agitation or addiction, which usually accompany excessive drinking of coffee.

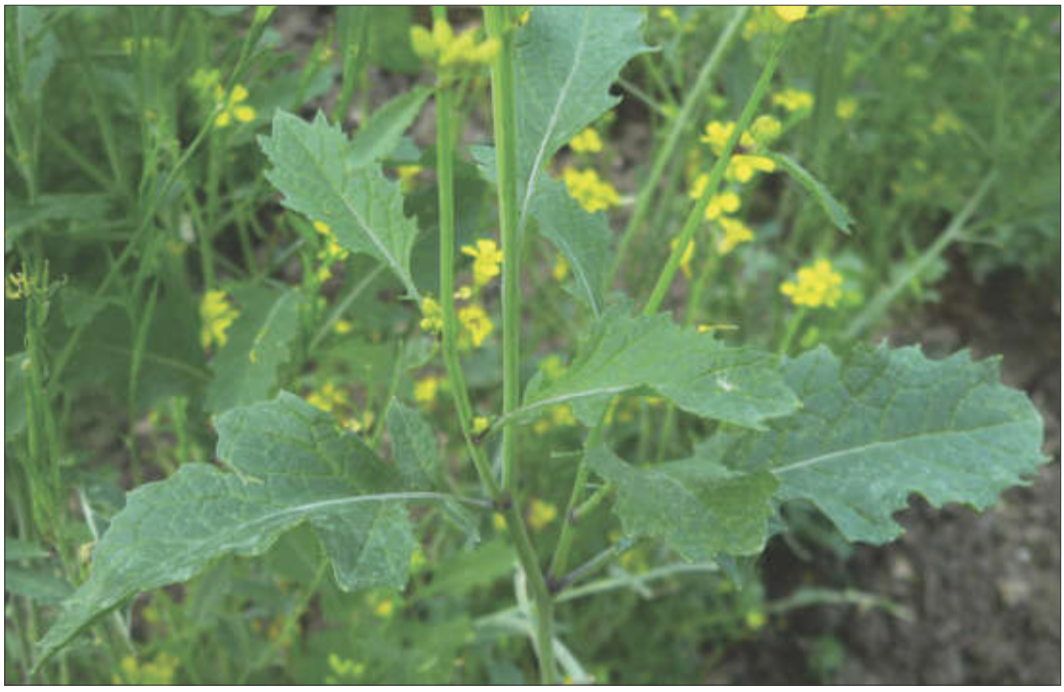
The more sunshine is exposed to the plant, the more polyphenol or tannin (catechin) are produced in the leaves. The earlier the tea leaves are harvested, the higher the contents of total nitrogen, caffeine, vitamin C, and free amino acid; the later the tea leaves are harvested, the more the polyphenol or tannin (catechin). The more fermented the leaves are, the less the contents of catechin and vitamin C.

In organic agriculture, the tea leaves have long been used as a natural pesticide by decoction or infusion. The tea leaves were mostly used for natural antibacterial agents or natural germicides. The more the sunshine sheds and the later the leaves are harvested, the content of catechin – that has antibacterial effects – increases. Therefore, it will be effective to collect the leaves grown in strong sunlight after summer.

Mustard

Allyl Isothiocyanate compounds, generated during the decomposition of sinigrin, are known to have strong antibacterial effects. Mustard extracts have been frequently used as natural antimicrobial agents for food.

Mustard and leaf mustard is a biennial or annual plant in the genus of Brassica in the Brassicaceae family. Botanically, various species and sub-varieties exist. In Chinese, it is called jiecai (芥菜); in English, mustard; and in Korea, Gat or Gyeoja. Leaf mustard is mostly used as vegetables while mustard is used as seasonings and drugs. Native to Central Asia, the species for producing oil was differentiated in India and the species for vegetables was differentiated in China.



PANCRAT. www.wikipedia.org

Mustard (Brassica juncea var. crispifolia L.H.Baily) grows to 1 to 2 m (3.3-7 ft) tall. The root leaves are long-elliptical, pinnate with serrated margins, but the stem leaves do not have serrates. In spring, the yellow flowers in the shape of a cross are borne in panicle. The fruit is a cylindrical pod with short sack and no hair. The brownish yellow seeds are inside the fruits. Various species exist including white mustard (B.alba) and black mustard (B.nigra).

Leaf mustard (Brassica juncea (L.) Czern.Var.juncea) grows to 1 m (3.3 ft) tall. In April to June, yellow flowers are borne in raceme and 4 petals are formed in the shape of a cross. The fruits, ripening in May to August, are long-conical and the yellow seeds are bead-shaped. The native leaf mustard introduced and cultivated in Korea for a long time has a lot of small thorns on the leaves, purple color, and strong pungent taste, but it is hardly cultivated these days as the species itself has degenerated.

Cultivation

If you want to use this plant as a natural pesticide, it is recommended to cultivate mustard or native leaf mustard with strong pungent taste. It is available to cultivate mustard in all parts of the country, but the plant is mostly cultivated in the temperate southern regions or at Jeju Island. The seeds are planted in autumn and the fruits are harvested in the next summer. The cultivation species is mostly the Yeongsanpo mustard and the yellow mustard introduced

MATT LAVIN. www.wikipedia.org

FOREST & KIM STARR. www.wikipedia.org

from Japan.

It is suitable to plant the seeds in early-to-mid October in the southern regions and around October 20 in Jeju Island. Drill plant and cover soil 2 to 3 cm (0.3-1.2 in) deep. After germination, do weeding and thinning. It is important to harvest the fruits at the right time. If you miss the harvesting season, shattering causes a considerable loss. 59 days after the flowering is the best time for harvest. Cut the plant by sickle and dry it up for a week and flick it. Dry the fruits in sun for 2 to 3 days for finishing.

Medical Uses

The seed of mustard and leaf mustard is called Gaeja. The powdered seeds are used as spice or mixed with water for salad seasoning. When you mix the powdered seed with water and stir it, a unique aroma and astringent pungency is generated by sinigrin components. Sinigrin is a glucosinolate contained in the Brassicaceae family plant, such as seeds of leaf mustard and mustard or rootstocks of horseradish. It is transformed to allyl Isothiocyanate compounds by myrosinase, a hydroloylitic enzyme. These

volatile compounds irritate the mucous membrane of eyes or nose.

According to "Dictionary of Oriental Medicines," Gaeja is described as following: "It is the dried matured seeds of mustard, leaf mustard, white mustard and black mustard, a biennial plant in the Brassicaceae family. Cut the entire stem when the pod turns yellow, dry it up and collect the seeds by flicking. It has a pungent taste and warm properties. It acts on the lung. It warms up the lung, loosens phlegm, stops coughing, reduces edema, and stops pains. In addition, when ingested a small amount, its stimulant activities facilitate digestive fluid secretion and strengthen the gastro-intestinal tract. However, a large amount of ingestion may cause vomiting or gastritis. Gaeja is used in the treatment of coughing caused by cold energy-drive myalgia, arthralgia, anorexia, carbuncles, low back pain, neuralgia, and rheumatoid arthritis. Take 3 to 6 g a day. It is not used for Yin-deficiency and heat energy excessiveness or fever cases. The pounded Gaeja is also used as a hot pack."

Allyl Isothiocyanate compounds, generated in the decomposition of sinigrin, are known to have strong antibacterial effect. In an experiment of fungi generation on bread, antibacterial property of mustard and horseradish mixed with water proved to be very strong. Therefore, the mustard extracts have been frequently used as natural antimicrobial agents for food. Spray the mustard mixed with water when cleaning the car air conditioner or the refrigerator.

In organic agriculture, such antibacterial effects of mustard can be used as a natural pesticide. Antibacterial activities of the mustard extracts mixed with water are very weak in the beginning, but they start increasing after 12 hours and reach the peak in 24 hours. Dissolve mustard in water and leave it for one day before use. Take caution as acidity of the water mixed with mustard also increases.

Securinega

In the early spring, the young shoot is edible as a vegetable dish. In oriental medicine, leaves, stems and roots are called “Ilyeopchu” and used as medicines. Securinine contained in securinega is a poisonous alkaloid, known to agitate the central nervous system of animals.

Securinega (Securinega suffruticosa Rehder) is a deciduous small tree in the Euphorbiaceae family, mostly in the form of shrubs growing to 2 to 3 m (7-10 ft) tall, but there are some species that grow up to 10 m (33 ft). It is wildly grown in all parts of the country and is also found in Japan and Taiwan. It grows well in relatively sunny valley areas and mountain foot.

Securinega resembles lespedeza but is not a lespedeza. The dark brown or

gray brown bark is vertically furrowed and the tip of the branch droops down. Young branch is usually red brown.

Lespedeza bicolor has tri-foliated leaves, while Securinega has simple leaves, arranged alternately, elliptical and with tranquil or wave-shaped margins. The leaves are slightly thick and both sides of the leaves are hairless. The under-leaf is whitish. The plant is dioecious, bearing light yellow flowers in June to July. The male flowers are borne in cluster on the leaf axil and have 5 calyxes and stamens, respectively. The female flowers are produced in a group of 2 to 5 on the leaf axil and have one pistil divided into 3 sections. The fruits are capsular, rounded and droop downward. They are divided into 3 sections in which 6 seeds are found in each.

Cultivation

It prefers partial-shade and mostly grows by the brook or the valley area. It is also found in dry area of the mountain foot and mountainside. It is relatively cold-hardy. It prospers in a relatively sunny place and is intolerant to pollution.

Propagation is made by seeding. Collect the seeds in the harvesting season (August to September) and bury them in the open field and sow them next spring.

Medical Uses

In the early spring, the young shoot is edible as a vegetable dish. In oriental medicine, leaves, stems and roots are called "Ilyeopchu" and used as medicines. Collect the plant in summer and dry it in sun. The whole plant contains securinine; its content is maximized in the flowering season and decreases in the harvesting season. The content of securinine found in the dried leaves is 0.2 to 0.3% in general. The young stem and the mature fruit also contain securinine, but less than the amount contained in the leaves. The leaves contain 13% of rutin, tannin, a small amount of allosecurinine, dihydrosecuririne, and 3 kinds of securinol. The root contains a large amount of allosecurinine (0.42%), a small amount of securinine, and securitinine, the methoxy body of securinine. The seeds contain 7.13% of oil. Securinine contained in securinega is a poisonous alkaloid, known to agitate the central nervous system of animals.

According to "Constituents and Medical Uses of Herbs," securinine is described as following: "It is used in the treatment of diseases caused by various functional damages in the central and the peripheral nervous systems: dyskinesia caused by degradation of reflex excitability in the nervous system; partial and complete paralysis caused by transmittable diseases, especially poliomyelitis; and facial nerve paralysis caused by cold and transmittable diseases. In addition, it is

also used in the treatment of weakness from illness, asthenia, low blood pressure, neurasthenia, acute heart failure, chronic alcohol intoxication, and sexual function deterioration. When this medicine is used in the recovery phase of poliomyelitis, mobility and tendon reflex are improved. However, a large amount may cause shortness of breath and convulsion. Take extra cautions for dosage."

In addition, securinine also has antibacterial and sterilization effects. A study revealed that it had antibacterial and disinfectional properties on fungi that feed on dead plants such as alternaria Alternata, Alternaria brassicae, Alternaria brassicicola, Curvularia lunata, Curvularia maculans, Curvularia pallenscens, Colletotrichum musae, Colletotrichum sp, Erysiphe pisi, Helminthosporium echinoclova, Helminthosporium spiciferum, and Heterosporium sp. Therefore, it is recommended to collect the whole plant in the flowering time when the content of securinine is highest, and infuse it in water or ethyl alcohol or dry up the whole plant and decoct it with water for natural pesticides.

Japanese hedge parsley

The matured fruits are harvested in late summer to autumn and dried up in sun. It has a pungent, bitter and sweet taste, and warm properties. It protects the kidney; eliminates wind, cold and moist energy; and kills parasites. In pharmacological tests, the plant killed trichomonas and demonstrated antifungal, anti-virus and male hormone functions.

Japanese hedge parsley (Torilis japonica (Houtt), DC.) is a biennial plant in the Apiaceae family. It is also called "Baemdorat" in Korea. It grows at the edge of small streams or meadows and is widely found in Japan, Taiwan, China, Africa, and Europe. The erect stem grows to 30 to 70 cm (12-28 in) tall and are covered in flattened hairs. They have a thin ridge and produce the twigs at the

top. The leaves are alternately arranged, tri-foliated and 2-pinnate, and with broader bottom on the petiole wrapping up the main stem.

In June to July, the white flowers are borne at the end of the stem and twig in double-umbel. 5 to 9 small peduncles are gathered to form one inflorescence and each small peduncle has 6 to 20 flowers. 4 to 8 involucral scales are linear and 1 cm (0.4 in) tall. The fruits are rice seed-shaped and 2.5 to 4 mm (0.1-0.2 in) long. 4 to 10 fruits are borne and the short spine on the fruits made them easy to attach to other objects.

Similar species include Cnidium monnieri, Torilis scabr, and Osmorhiza aristata. Cnidium monnieri has 15 to 30 small peduncles and 8 to 11 involucral scales. The fruits are elliptical, with the white ridge resembling a wing. Torilis scabra produces flowers in May to June and has 2 to 4 small peduncles. There is no involucral scale or only one very thin involucral scale. Fruits are borne in a group of 3 to 6, 4.5 to 6 mm long, long-elliptical and with spines.

Cultivation

Japanese hedge parsley is a biennial plant, commonly grown at the edge of small streams or meadows. The flowers are borne in June to August and the fruits ripen in August to September. Cnidium monnieri or Torilis scabr bears fruits a little bit earlier than the Japanese hedge parsley. Fruits are collected at maturity and planted in the next spring. It grows well in well-drained soils in rainy seasons. It is relatively tolerant to diseases and pest injuries. Too much nitrogen may cause the plant to grow excessively, leading to fall off and decay.

Medical Uses

The young shoot is edible as a vegetable dish and the fruits are used as medicine. In China and Japan, only the fruits of Cnidium monnieri are used.

According to "Dictionary of Oriental Medicines," the Japanese hedge parsley is described as following: "It is the dried fruits of Cnidium monnieri. Cnidium monnieri grows in the wetlands of mountains, fields and roadsides. The fruits that ripen from late summer to autumn are collected and dried up in sun. It has a pungent, bitter and sweet taste, and warm properties. It acts on the nerve. It protects the kidney, eliminates wind, cold and moist energy, and kills parasites. In pharmacological tests, Japanese hedge parsley exterminated trichomonas and had antifungal, anti-virus, and male hormone functions. It is used in the treatment of trichomonas vaginitis, vaginal pruritus, erectile dysfunction, skin pruritus, and leucorrhea. Take 3 to 10 g in herbal infusion. For external medicines, rinse the affected are with the decoction."

According to "Donguibogam (Eastern Medical Manual)," "It has tranquil and warm properties. It has bitter, pungent, and sweet taste with no toxicity (or just a little bit of toxicity). It is used to treat vaginal pains, erectile dysfunction, and wet and itchy inguinal region. It warms up the internal organs, reduces excessive energy, warms up the uterus, and improves the stamina. The wind and cold energies disappear when you rinse the reproductive organs with the plant decoction. It increases libido and treats waist pains, sweating in inguinal region, and eczema. It decreases the amount of urination and treats red and white leuc-

orrhea."

According to "Constituents and Medical Uses of Herbs," Japanese hedge parsley fruit has 1.4% essential oil and the major ingredients of the essential oil are α-cadinene and torilene. The whole plant contains 0.3% of quinine and 0.28% of coumarin. The fruits of Cnidium monnieri contain 1.3 to 3% of essential oil and coumarin. The major ingredients of the essential oil are α-pinene, ι-camphene, 2-borneol, terphenol and 2-valelian acid bornyl ester. 0.6 to 0.7% of coumarin is contained in the fruits. The fruits contain about 10 procoumarin compounds: columbianidin, columbianetin, edultin, osthole, isopimpinellin, xanthotoxol, imperatorin, cnidin, and cnidiadin. In particular, torilen extracted from the hedge parsley is known to have pain killing, anti-inflammatory, and antibacterial effects.

Antibacterial effects of the Japanese hedge parsley or Cnidium monnieri can be used as a natural pesticide. Infuse the fruits or the whole plant or dry them up and decoct them for use.

Temple Juniper

The fruits, called "Dusongsil," are used as oriental medicine or as spice for Gin, a brand of western liquor. The unique aroma from Temple Juniper comes from the essential oil, which has antibacterial effects of phytoncide, as in the case of Hinoki cypress.

Temple Juniper (Juniperus rigida Seibold& Zucc.) is an evergreen tall tree in the Cupressaceae family. It usually grows in the sunny mountain foot and is also found in Japan, China, Mongolia, and Siberia (Amur River areas). It grows to 8 m (26 ft) tall and 20 cm (8 in) in diameter, and has erect branches growing up straight like a broom. The brown bark is vertically thin-furrowed, and the root is shallow-seated under the soil surface.

The leaves are needle-shaped, 12 to 20 mm (5-8 in) long. 3 to 4 leaves are spirally arranged on each node. The leaves have 3 ridges and the narrow white furrow on the surface. The tip of the leaves is acute and hard. The plant is dioecious and the greenish brown flowers are

borne in April to May on the leaf axil of the previous branches. Male flowers are borne in a cluster of 1 to 3 and have 20 scales with 4 to 5 anthers at the bottom. The female flower is borne in single and has 9 fruit pieces. The fruits are 7 to 8 mm (0.3 in) in diameter, rounded, have 3 small bumps and ripen black purple in October of the following year. 3 to 4 ovate seeds are produced.

Cultivation

The plant grows well in sunny mountain slope, dry and barren places and limestone zone. It is very tolerant to cold. Well-drained sandy soil is preferred for cultivation. It does not grow well in a place with high humidity. Propagation is made by seeding or cutting. For seeding, collect the fruits in autumn and remove the fruit flesh. Store them in the open field and sow the seeds in the next spring. Germination is mostly made 2 years after the sowing. For early germination, sulfur treatment is sometimes made. For cutting, cut the branch of

the previous year in mid-March to mid-April 10 to 20 cm (4-8 in) long for planting. Rooting is relatively easy.

Medical Uses

Temple Juniper, with its soft wood substance and resistance against decay in water, has been mostly used to make farm implement such as rake handles, bull leaders, and basket frames. The fruits, called "Dusongsil," are used as oriental medicine or as spice for Gin, a brand of western liquor. The unique aroma from Temple Juniper comes from the essential oil. The essential oil contained in the fruits is called "Dusongyu." Its major ingredients include pinene, camphene, terpineol, and sabinene. These components have antibacterial effects of phytoncide, as in the case of Hinoki cypress.

According to "Dictionary of Oriental Medicines," Dusongsil, the fruits of Temple Juniper is described as following: "The matured fruits are harvested in

autumn and dried up in shade. It eliminates bad wind and moist energy and improves urination. Pharmacological tests demonstrated that the plant improves stomach functions, loosens phlegm, and has antifungal effects. It is used in the treatment of edema, disease on urinary bladder and urethra, rheumatoid arthritis, and amebiasis. Take 1 to 3 g a day as a decoction. For external medicines, pound the plant and apply it to the affected area." The content of the essential oil in the fruits is found in the highest concentration when harvested in November.

In organic agriculture, inhibition of bacteria and antibacterial effects of the essential oil in Temple Juniper can be used as a natural pesticide. Infuse the fruits and leaves in water or ethyl alcohol, or dry them up and decoct them with water for use.

Japanese Aralia

Japanese Aralia is popular for an indoor air filtering plant. In folk remedy, the dried leaves are added to bathing water to treat rheumatism and neuralgia, or the decoction of the leaves is used to treat coughs and as anti-inflammatory drugs.

Japanese Aralia (Fatsia japonica (Thunb.) Decne. & Planch) is an evergreen shrub in the Araliaceae family, growing to 2 to 4 m (7-13 ft) tall. The leaves are alternate and divided into 7 to 9 section to make a palm shape. They are hairless on both sides and glossy. The leaves have serrated margins and the petiole as

long as the leaves. It grows in Bijin Island at Tongyoung and Geoje Island and is frequently planted in the southern islands or the seaside. It is also found in Japan and Taiwan.

The flowers are borne in October to November, just right before winter begins. The tiny white flowers are borne at the end of the spray in the rounded umbrella shape, forming a large panicle. The panicle is 20 to 40 cm (8-16 in) long and 5 to 8 cm (2-3.1 in) in diameter. The tiny white flowers are 5 mm (0.2 in) long and have 5 petals and 5 pistils and stamens, respectively. The fruit is a round berry 5 mm (0.2 in) long and ripen black in April to May of the following year.

Cultivation

Japanese Aralia is an extremely shade-loving tree, growing in stocks in the evergreen forest at the beach. Its preferred habitat is fertile soil in shade with moderate moisture. As it is intolerant to cold, it is impossible to culture it in open field in the central regions and the pot or the greenhouse should be used for cultivation. Propagation is made by seeding, cutting or dividing suckers.

For seeding, collect the mature seeds in May and plant the seed after removing the fruit flesh. Germination is made immediately in summer. The over-ripened and fallen seeds or excessively dried seeds on the tree hardly ever germinate. Avoid dryness of the seeds. It is recommended to cut the branch after it is sufficiently hardened, but it is also possible to cut the green branches. Cutting is usually done in March to April, June to July and September. Dividing suckers is also possible for cultivation.

Medical Uses

Japanese Aralia is popular as an indoor air filtering plant. It has an excellent power in eliminating formaldehyde, a cause of sick-house syndrome, and generates considerably more anion than Sansevieria. The leaves are also used as dye. In folk remedy, the dried leaves are added to bathing water to treat rheumatism and neuralgia, or the decoction of the leaves is used as cough drugs and anti-inflammatory drugs. However, due to strong toxicity, it is dangerous to take the decoction.

The toxic components contained in the plant are α-fatsin and

β-fatsin. The root skin contains α-fatsin and β-fatsin, and the leaves contain α-fatsin. Fatsin, a kind of blood poison, belongs to triterpenoid saponins that have hederagenin and oleanic acid as aglucone. It mostly acts on red blood cells or blood pigments to generate hemolysis. It is not a fatal poison but ingestion may cause vomiting, abdominal pains, diarrhea, and stomach mucous membrane ulceration.

According to "Constituents and Medical Uses of Herbs," fatsin has: "strong hemolysis and local stimulation effects. When 5 ml of 1,000 times diluted solution is injected to the subcutaneous skin of the rabbit, the skin turns red in one hour, and the tissue festers gradually and enters necrosis. Similar to other saponin activities, the rabbit dies of the central paralysis." As in the case of Japanese Snowbell fruits, fish float up to the water surface due to respiratory failure when the pounded leaves are released into the water. In organic agriculture, extract juice from the Japanese Aralia leaves or decoct them with water for use as natural pesticide.

Korean plum yew

In oriental medicine, the red fruits, called "Tohyangbi," are used in the treatment of anthelmintic, constipation, cough, sputum, and for sthenia. Recently, the alkaloid components extracted from the Korean plum yew are used in the treatment of lymphoma, esophageal cancer, and lung cancer.

Korean plum yew (Cephalotaxus koreana Nakai) is an evergreen conifer shrub in the Cephalotaxaceae family, growing to 3 to 6 m (10-20 ft). It is mainly found in central region of Korea (Gyeonggido and the south of Chungcheongbukdo). It mostly grows in moist and shady areas such as abysmal ravines or valleys. Similar species also are found in Northeast Asia and Himalayas, including China and Japan. The leaves are linear with acute tip but

softer than the nutmeg tree and therefore, they bend easily. In addition, the main vein of the leaves is extruded out on both sides. There are 2 lines of white stomas under the leaf.

The plant is dioecious and produces fruits in April. 20 to 30 pale brown male flowers are arranged in cluster along the branch under the leaf axil, and the female flowers are borne in group of two at the end of the branch. 10 pale green bracts are surrounding the flowers. The fruits are elliptical and ripen red in August to September of the following year.

Cultivation

Korean plum yew grows well in shady and moist areas. As it is cold-hardy, cultivation is available in all parts of the country. It hardly ever suffers from diseases and pests and grows relatively fast. Propagation is made by seeding and cutting. For seeding, collect the seeds in autumn; store them in open field; and

plant the seeds in March to April of the following year. For cutting in February, cut a branch from the previous year; in June, cut a new branch that grew that year. Remove the leaves in the lower part and soak the branches in water before sticking. It is recommended to shade from the sun. The best time for transplanting is March to April or October. Water the plant sufficiently after transplanting.

Medical Uses

The lumber was used to make tools and the seeds were used to extract edible oil or lamp oil. In oriental medicine, the red fruits, called "Tohyangbi," are used in the treatment of anthelmintic, constipation, cough, sputum, and for sthenia. Recently, the alkaloid components extracted from the Korean plum yew are used in the treatment of lymphoma, esophageal cancer, and lung cancer.

Major alkaloid components of the Korean plum yew include homoharringtonine, harringtonine, and cephalotaxine. Homoharringtonine takes up 40% of the total alkaloid components, followed by harringtonine (32%) and cephalotaxine (28%).

According to a study, the alkaloid content is the highest in the Korean plum

yew growing in the southern regions and in winter, and the leaves have twice more alkaloids than the stems. Overdose may damage the liver, kidney, and heart, causing side effects such as arrhythmia, thrombocytopenia, dyspnea, or telangiectasia.

According to "Dictionary of Oriental Medicines," the nutmeg tree (Torreya nucifera Sieb. Et Zucc) fruit is described as following: "Collect the ripe fruits in autumn and peel the skin and dry them up in sun. It has a sweet taste and tranquil properties. It acts on the lung and large intestine meridians. It kills parasites, helps bowel movement, and stops coughing. In pharmacological test, it was found that the nutmeg tree fruit kills dipylidium caninum, roundworm, pinworm, and ancylostomiasis. It is mostly used in the treatment of taeniasis, as well as ancylostomiasis, oxyuriasis, and ascariasis. It is also used to treat infant nutritional disorder, constipation, and dry cough. Take 20 to 30 g a day as a decoction, pill or powder."

In organic agriculture, anti-insect and antibacterial effects of the Korean plum yew or the nutmeg tree can be used as a natural pesticide. Extract juice from the stem including the leaves, decoct it with water or infuse it in alcohol for use.

Corydalis

Corydalis is a poisonous plant, used for pain killing, contusion, scabies, furuncles, shigellosis, and abdominal pains in folk remedy. With several kinds of alkaloids, the corydalis can be used as a natural pesticide in organic agriculture.

The corydalis species is an annual or biennial poisonous plant in the Papaveracceae family, mostly growing in wet places of mountains and fields. The corydalis species include Corydalis Speciosa, Corydalis ochotensis, Corydalis pauciovulata, Corydalis heterocarpa, Corydalis incise, and various others. Corydalis pallida grows to 20 to 50 cm (8-20 in) and the leaves are 1 or 2-pinnate compound and with the petiole. The stems are weak and the entire stem is white green. In April to July, the dark yellow flowers are borne at the end of the

stalk in raceme. The fruits are beads-shaped and ripen in August to September.

Corydalis Speciosa (Corydalis Speciosa Maxim.), commonly found in mountains, grows to 50 cm (20 in) tall and the leaves are more thinly foliated compared to Corydalis pallida.The entire plant is powdered in white and the stem is empty. The flowers are yellow and the fruits have nodes like beads. The seeds are black and rounded. Corydalis incisa (Thumb.) Pers. produces the red-purple flowers and the long, elliptical fruits. The leaves of Corydalis ochotensis, Corydalis pauciovulata and Corydalis ochotensis for Raddeana are foliated in the long-elliptical or obovoid form and they produce the yellow flowers in July to September, instead of spring. The fruits are also obovoid and the seeds are arranged in two rows.

Cultivation

Although the corydalis is a biennial plant, cultivation is relatively easy as the plant continues to grow and develop every year once it is planted and is very

tolerant to diseases and pests. The plant is suitable for ornamental gardening as its flowering period is long (April to June) and the flowers are colorful. Corydalis Speciosa grows well in relatively well-drained sandy loamy gritty soils. It likes sunlight and can stand winter outdoors.

Propagation is made by seeds and division mostly. Collect the seeds in early June and immediately sow them. Germination occurs in August to September and the flowers bloom in the following spring. Division and transplant should be made in October to November before winter or in spring (April). Avoid dryness. Too much fertilizer or too fertile soils may make the plant overgrow and freeze to death in winter.

Medical Uses

Corydalis is a poisonous plant that is used for pain killing, contusion, scabies, furuncles, shigellosis, and abdominal pains in folk remedy. It reduces fever, neutralizes poison, and treats swollen furuncles. Dig out the plant in spring and

remove the over-the-ground part. Rinse it thoroughly and dry it in the sun. It is used for external medicines. Apply the pounded plant or juice extract of the plant on the affected area.

The corydalis species contain various alkaloid components, including protopine, capauridine, capaurine, capaurimine, corydaline, pallidine, kikemanine(l-corydalmine), l-tetrahydropalmatine, sinoacutine, isoboldine, cryptopine, and dl-stylopine.

Corydalis incisa is used for dye, too. The whole plant contains isoquinoline alkaloids, such as protopine, corynoline, acetylcorynoline, cprynoloxine, and 6-oxocorynoline. It kills parasites and poison neutralization effects.

In organic agriculture, the corydalis species, a poisonous plant with various alkaloid components, can be used for a natural pesticide. Extract juice from the whole plant, decoct it with water or infuse it in alcohol.

Korean Pasqueflower (Baekduong)

The root of Korean pasqueflower, called "Baekduong," has been used as a traditional herbal medicine for rheumatoid arthritis, neuralgia, and lymphadenopathy. With strong toxicity, it was the main ingredient of lethal poisonous drink for killing people.

Korean pasqueflower (Pulsatilla koreana Nakai) is a perennial plant and belongs to the Family Ranunculaceae. It grows in a sunny place of mountains and meadows. It used to be very common in Korea before, but now, it is not as widespread. In spring, leaves sprout out as a group from the deeply-rooted thick taproot and grow diagonally. The plant has trifoliate leaves and each leaf is composed of 5 leaflets. Each leaflet is three-lobed and entirely covered with white hairs.

The red-to-purple flower blooms between March and May; usually face down. The flower is bell-shaped and has 6 petals with plenty of yellow stamens. When pollination is done and the flowers fall, the bent peduncle erects to bear fruit. Fruit is an achene. It is shaped like a long egg with long white hair, which looks like white hairs. It is why Korean pasqueflower is called "Nogocho" (grandmother plant) or "Baekduong" (white haired grandfather).

Cultivation

The plant grows well in sunny, well-drained, humus-rich gritty soil. Too much moisture in soil may make the roots rot. Propagation is done by seeding or root cutting. It is best sown as soon as the seed is ripe in May-June for good germination. Dust off hairs when sowing the seed on the seedbed and cover shallow soil just enough to cover up the seed. The seed usually germinates in about 2-4 weeks if the outer soil is not dry. For root division, cut the thick root by 5 cm (2 in) and pot it. Alternatively, plant a long root horizontally for it to produce sprouts which, later, can be cut for planting. The plant does not grow well in acidic soil. Add lime for better growth.

Medical Uses

The root, called "Baekduong," has been used as a traditional herbal medicine. From fall to early spring before sprouting, dig up the root, rinse it with water, and dry it in the sun for use. The plant has cold properties and bitter taste. The root has been used in the treatment of

rheumatoid arthritis, neuralgia, lymphadenopathy, and paramenia. The stem and leaves have been used in the treatment of backache, knee and joint pains, as well as edema and cardiac pain, and its powders can be used for pyoderma, itching, and various skin diseases. In the past, the root was used as a main ingredient in concocting a lethal poisonous drink.

According to "Constituents and Medical Uses of Herbs," the root contains several medically active constituents including anemonin (in the form of protoanemonin in case of the fresh root) and tannin. In addition, it also has 4 saponins containing hederagenin in the aglycone. With toxicity, protoanemoni causes inflammation in the skin and necrosis of cells. The root has a sterilizing and anti-parasitic effects.

In "Dictionary of Oriental Medicines," Korean Pasque Flower is recorded as followings: "It reduces fever, has detoxification effect, eliminates blood fever, and disperses extravasated blood. In pharmacological test, it was identified that the plant has anti-parasitic and disinfection effect against various bacteria, in-

cluding entamoeba histolytica and trichomonas vaginalis. It is also used in the treatment of shigellosis, amebiasis, tuberculous cervical lymphadenitis, malaria, epistaxis, and tinea pedis. Take 9 to 15 g a day in the form of herbal infusion, powders or pills. For external uses, pound hard the plant and apply it to the affected area. Cut the root or the entire plant into small pieces and sprinkle around the place with maggots. Take cautions in using a large amount, as the plant is toxic."

In organic agriculture, the toxic root of Korean Pasque Flower is used as a natural pesticide. Imported roots are of reasonably; or you can grow your own. The plant is known to be effective for exterminating stinkbugs and mosquitos in greenhouses. Extract juice from the plant, decoct it in water or infuse it in alcohol for use.

Japanese belladonna

Japanese belladonna is a notorious poisonous plant. Alkaloids are found in the entire plant body. In oriental medicine, the rootstock, called "Nag-tanggeun," is usually used as tranquilizer and pain killer.

The Japanese belladonna (Scopolia japonica Maxim) is a perennial plant in the Solanacecae family, mainly growing in the deep forest ravines. It grows to 30 to 60 cm (12-24 in) in height. The ginger-shaped rootstock trails sideward and the stem comes up at the tip of the rootstock. The entire plant is pale and hairless. The leaves are alternately arranged, elliptic-ovate with smooth margins. In April to May, one dark purple flower is borne on each leaf axil; drooping downward. The flowers are bell-shaped and sympetaous with the yellow interior and 5-lobated tips. There are 5 stamens.

The fruits are capsular, rounded and wrapped in the grown calyx. At maturity, they split open like a lid. The seeds are reniform and net-patterned. In summer, the Japanese belladonna becomes stem-less and leafless, entering an early dormant period. If cows or people ingest this plant, they rave like a madman; hence the name "Michigwangipul" (mad person plant) in Korean. Similar species include yellow-flowered Japanese belladonna (Scopolia lutescens Y.Lee).

Cultivation

The Japanese belladonna mostly grows in rich humus and moist soils in partial-shade in remote mountains valleys. It is recommended to cultivate the plant in relatively moist and shady places. Propagation is mainly done by root division. Divide the rootstock with the bud attached before the new sprout appears in early spring and plant it. The plant is tolerant to cold that it doesn't freeze to death even if the root is exposed in winter. So there is no need to plant too deep. Add completely decomposed manure and leaf mold sufficiently. It is known that the propagation by seeding is not very successful. In case the seeds are collected, directly sow.

Medical Uses

The Japanese belladonna is a well-known poisonous plant. Alkaloids are found in the entire plant body. The alkaloid content in the rootstock is the highest in early spring and autumn, and the lowest in the flowering season. In oriental medicine, the rootstock, called

"Nagtangkeun," is usually used as tranquilizer and pain killer. After the leaves fall off, dig out the root-stock, rinse it with water, and dry it in sun.

The major alkaloid components include hyoscyamine, atropine, scopolamine, and couskhigrine. In addition, the fluorescent substances such as scopoletin and scopoline, commonly found in the Solanaceae family plants, are contained. Hyoscyamine and atropine paralyze the peripheral nerve in the parasympathetic nerve, expand pupil, constrain secretion of adrenalin from the adrenal gland, increase the heart beat, and relax the smooth muscle of bronchus, stomach, and intestine. Scopolamin, compared to atropine, is weak on the peripheral nerve but it constrains the central nervous system, causing tranquilization, hypnosis and weakening of mobility.

According to "Constituents and Medical Uses of Herbs," medicines made of the Japanese belladonna and atropine are used as spasmolytic drugs and pain killer in the treatment of gastro-duodenal ulcer, pylorospasm, chronic hyperacidity, intestine convulsion, asthma, cholecystitis, cholelithiasis, and renal colic.

However, it only has a temporary effect on the changes in tissue, such as tumors, and convulsion and pain by calculus. Atropine is also used in the treatment of disease on the heart vein such as bradyrhythmia, AV block, angina

pectoris, and myocardial infarction. It is also used in the ophthalmology for the purpose of diagnosis and treatment, but it should not be used for glaucoma. Scopolamin is a tranquilizer, and it is effective for treating excessive excitement in the central nervous system, especially psychomotor excitement, when a sleeping pill is not effective."

Overdose may cause poisoning symptoms: dry mouth and throat, dilatation of the pupil, excitement, confitsion, fever, hallucination, and convulsion. In the worst case, unconsciousness, respiratory paralysis and weakening of the heart activity finally lead to death. The lethal dose of atropine is over 100 mg.

In organic agriculture, such toxicity of the lily of the Japanese belladonna can be used as a natural pesticide. Alkaloids are contained not only in the rootstock but also in the entire plant. Decoct the entire plant with water or infuse it in alcohol for use.

Royal Azalea

Andromedotoxin is a strong convulsivant, commonly found in the Ericaceae family plants. Excessive ingestion may cause motor paralysis, shortness of breath, leg and arm convulsion, and in the worst case, death, caused by paralysis of the respiratory system. Although it is very toxic, an appropriate amount of administration is effective as a hypotensive agent.

The Korean azalea (Rhododendron yedoense f. poukhanense) and the royal azalea (Rhododendron schlippenbachii Maxim.) are the two most common Royal Azalea growing in Korea. The Korean azalea grows to 1 to 2 m (3.3-7 ft) tall. The scale and the calyx of the fresh sprouts are sticky with viscosity. The leaves are long-elliptical and narrow-ended at both sides. The margin is not serrated. The leaf surface is covered in sporadic hairs and the vein and the petiole

under the leaf is densely covered in brown hairs. In April to May, the reddish pale purple flowers are borne in a group of 2 to 3 at the end of the stalk.

Royal Azalea grows to 2 to 5 m (7-16 ft) tall in the mountain ridges mostly. The leaves are obovate, with rounded tips, and flat margins. The hairs on the surface gradually disappear and the vein under the leaf is covered in pale green hairs. The leaves are alternately arranged but it looks like 4 to 5 leaves are spirally arranged at the end of the branch. The flowers are borne along with the leaves in May and have fragrance. Pink flowers are produced in umbel in cluster of 3 to 7 at the end of the stalk.

Cultivation

The royal azalea root is shallowly seated with a lot of fine roots and has strong germination ability. The plant grows well in partial-shade and it also grows well in sun if enough moisture is provided in soils. The plant prefers acidic humus-rich, fertile soils.

Propagation is made by seeds, division or cutting. For seeding, collect the matured seeds in autumn and store the seeds in the air-dried state. Sow the seeds on the moss in the following spring and nurse the saplings. The best time for cutting is May to June.

Medical Uses

In oriental medicine, the royal azalea flowers, called "Cheokchok," are used as hypotensive agents, but the dosage should be carefully controlled as they are very toxic.

According to "Constituents and Medical Uses of Herbs," the royal azalea is described as following: "The leaves contain andromedotoxin, avicularin, hiperosid, and oleanolic acid. The andromedotoxin content is found in the highest concentration in the flowers (13mg%). In the leaves, the andromedotoxin content is high in spring (12mg% in May), and gradually decreases from summer (June8mg%, July3 to 4mg%, August 2 to 3mg%) to autumn (September 1 to

2mg%). Almost no andromedotoxin is found in the autumn leaves.

Andromedotoxin acts as hypotensive agents and the flavonoid components strengthen the capillary, improve urination, and slightly reduce the blood pressure. Triterpenoid strengthens the heart and fights against inflammation and reduces cholesterols in the blood."

Andromedotoxin is a strong convulsivant, commonly found in the Ericaceae family plants. Too much ingestion may cause motor paralysis, shortness of breath, leg and arm convulsion, and in the worst case, death caused by paralysis of the respiratory system. The andromedotoxin content of the Korean rosebay flowers is only 1/5 of the royal azalea, while Rhododendron fauriei has the highest andromedotoxin content. Although it is very toxic, an appropriate amount of administration is effective for hypotensive agents.

The whole plant boiled in water was used to kill skin bugs of domestic animals, insects on the agricultural crops, and in the squat toilets. In organic agriculture, Royal Azalea can be used as a natural pesticide. Decoct the entire plant including the flowers with water or infuse it in alcohol for insecticide.

Lily of the Valley

The entire plant is poisonous. Toxic components are found in the entire plant body but they are especially in high concentration in the rootstock, flowers, and seeds. Its physiological functions are considerably stronger than those of the digitalis. Convallatoxin shows stronger activities than other cardiac glycoside but its sustainment time is shorter.

Lily of the Valley (Convallaria keiskei Miq.) is a perennial plant in the Asparagaceae family, growing to 25 to 35 cm (10-14 in) tall in mountain areas. The subterranean stem is trailing sideward and the new buds are produced in group from the stem. The plant has fibrous roots. 2 young leaves are borne in curled shape and arranged in opposite pairs as they grow. The leaf blade is long-elliptical or ovoid, 12 to 18 cm (4.8-8 in) long and 3 to 7 cm (1.2-2.8 in) wide. It has acute tips, long petioles and smooth margins.

6 to 12 bell-shaped flowers are borne in a row at the end of the flower stalk in May to June facing downward. The flowers are fragrant

and the tip of the flowers is 6-foliated and curled backward. There are 6 stamens attached under the corolla. The style is short. The flower stalk is borne under the leaves, and the bract is membranous (semi-transparent like a thin paper) and wide-line patterned. The fruit is a berry, rounded and ripen red in July.

Cultivation

Lily of the valley grows in group under broad-leaved trees or at the meadow of high mountains. It prefers humus-rich, moist, clay-loamy soils. Mix the mountain sand with leaf mold and plant the lily of the valley in the partially-shaded area or under big tree for good cultivation. Propagation is made by dividing suckers and seeding.

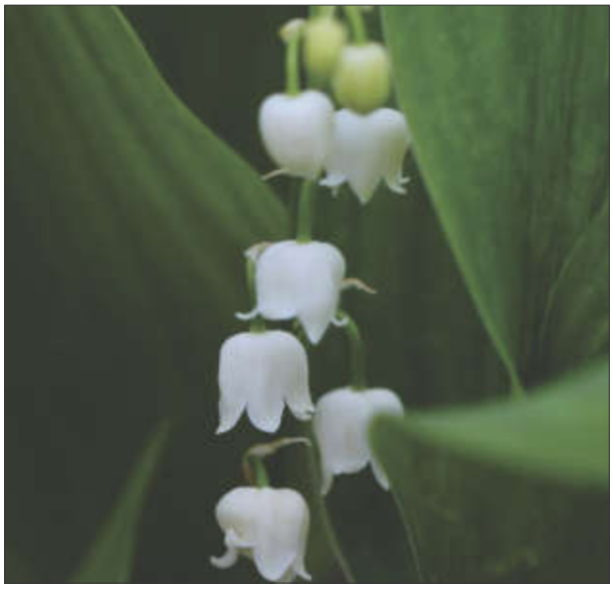
Dividing suckers is done in November when the leaves fall off or in early spring. Do not divide into too tiny a head. Division cycle is once every 3 years. It takes more than 5 years until the flowers are borne in the case of seedling propagation. When cultivating the plant in the pot, leave the pot outside in winter and bring it inside in early spring and place it near the windows to produce

the flowers early. After the flowers are borne, move the pot into a partial-shade.

Medical Uses

The plant is cultivated for ornamental gardening and it is also used to manufacture high-quality perfume due to the gentle fragrance of the flowers. In oriental medicine, the whole plant and the root, called "Youngran," is used as medicine for neurasthenia, edema, and contusion. However, the entire plant is poisonous. The beautiful flowers, as well as the tempting young sprouts, are dangerous. If ingested, this highly poisonous plant may cause heart failure and kill you.

The major toxic components contained in the plant include convallatoxin, convallaside, convallatoxol, deglucocheirotoxin, and keioside. All of them are cardiac glycosides and give a strong action to the heart. Toxic components are found in the entire plant body but they are especially in high concentration in the rootstock, flowers, and seeds. Its physiological functions are considerably stronger than those of the digitalis. Convallatoxin shows stronger activities than other cardiac glycoside but its sustainment time is shorter.



Poisoning symptoms include vomiting, headache, dizziness, visual handicap, remaining pulse, and blood pressure drop. In the worst case, blood coagulation and heart failure occurs, leading to death. The lethal dose of convallatoxin is known to be 18 mg for an adult with 60 kg (132 lb) of body weight. Sometimes, people confuse the lily of the valley leaves with Allium microdictyon Prokh and ingest them, leading to death. In case of indoor

cultivation, poisoning accidents happen when children eat the flowers or fruits of this plant. In one case, a child died of drinking the water in the vase that the lily of the valley was cut and placed.df

In the "Dictionary of Oriental Medicines," the lily of the valley is described as following: "Cut the whole plant before the flower buds appears in spring and dry it up in shade. It has a sweet bitter taste and warm properties with toxicity. It improves the stamina, improves urination, facilitates the blood circulation, and eliminates bad cold energy from the body. It is found that convallatoxin, the main ingredient of the plant, as well as cardiac glycosides contained in the plant, strengthens the heart, increases urination (when a small amount is used), restrains the central nerve system, and improves bowel movement. The plant is used in the treatment of weakening of the heart, cardiac neurosis, cardiac metabolic function disorder, cardio sclerosis, edema, atypical vaginal bleeding, leucorrhea, and contusion. Take 3 to 9 g of herbal infusion a day, or take 0.2 to 0.3 g of powdered plant three times a day. It is also used as an injection or a tincture."

In organic agriculture, such toxicity of the lily of the valley can be used as a natural pesticide. Extract juice from the whole plant, dry it up and decoct with water or infuse in alcohol for use.

Thunberg's Geranium

Thunberg's geranium has a clear anti-diarrheic effect. Even if a large amount is taken, there are no side effects and it does not decrease appetite. It kills shigella, typhoid bacillus, and colon bacterium. It is used in the treatment of diarrhea and abdominal pains, and as an anti-diarrheic agent for bloody flux.

Thunberg's geranium is a perennial plant in the Geraniaceae family. In Korea, about 10 species of the genus geranium are found: geranium thunbergii, geranium koreanum, geranium sibiricum, geranium Wilfordii Maxim, and Geranium krameri. Thunberg's geranium (Geranium thunbergii Siebold & Zucc) has 3 to 5-foliate leaves with the black pattern on both sides in general. It spreads out sideward. The red-purple flowers 15 mm in diameter are borne in August to September in the group of two at the end of the peduncle. Some

thunberg's geranimun have white flowers. The plant has short hairs and tentacles on the stem, peduncle and calyx. The fruits are the candle-stick-shaped capsule, 5-lobed, and curled upward.

Geranium koreanum usually grows in high mountains. The leaves are curly-foliate in the form of palm. The stem is erect and grows to 1 m (3.3 ft) tall. Pale red flowers are born in June to July, 20 mm in diameter. There are white flowers, too. Geranium sibiricum has a thin and obliquely trailing stem. Compared to the thunberg's geranium, the leaves are 3 to 5-foliate in the deeper and thinner form. Pale red flowers produced in June to August are 10 mm in diameter. Single inflorescence from the leaf axil is borne at the end and 3 veins are found clearly on the petal.

Cultivation

Propagation is made by seeding or dividing suckers. For seeding, collect the seeds in September to October and sow them immediately or in the next spring. When the new sprouts appear, move the plant into the main field in autumn. Ssucke division is done when the over-the-ground plant is dry, that is, in late September to October or in early March of the following year. Divide the head in an appropriate way for planting.

Geranium koreanum mostly grows in high mountains and its preferred habitat is well-ventilated, cool environment. When planted in the general bare grounds, the geranium koreanum prospers in spring but its growth slows down

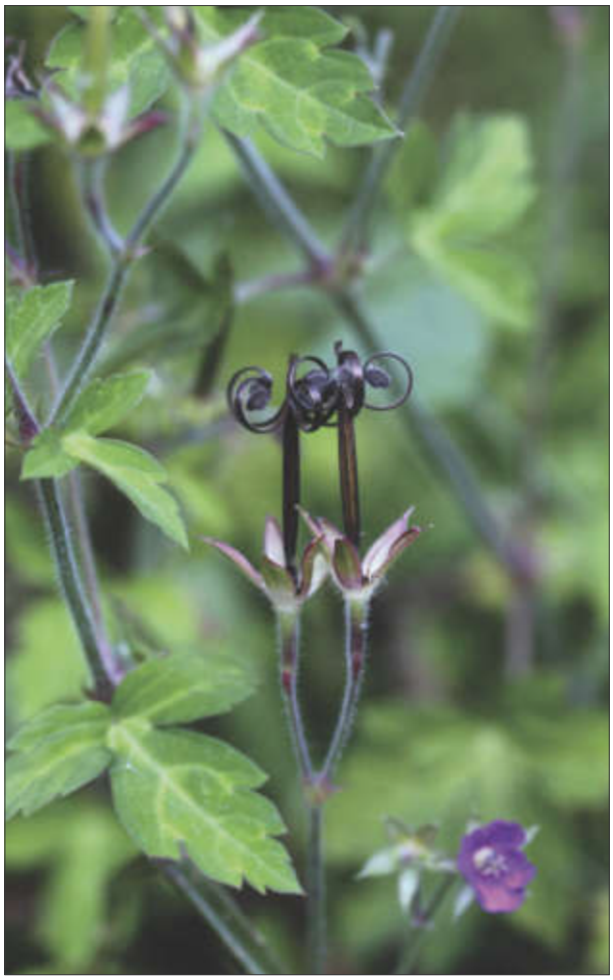
in summer because of summer heat wave. Therefore, it is recommended to cut the over-the-ground part in late June and leave the plant alone until the sprout appears again in autumn.

Medical Uses

The fresh sprout is edible as a vegetable dish. Thunberg's geranium and geranium sibiricum, called "Nogwancho" or "Hyeon-cho," are used as medicines. Cut the above-ground part twice a year in summer and winter and dry it up in sun. Hang the plant in well-ventilated area for drying before use.

The whole part of the thunberg's geranium contains tannin, Gallic acid, succinic acid, quercetin, glycosides, and kaempferitrin. Tannin is found in highest concentration in the leaves. The tannin content changes by season; it is the lowest from December to February and gradually increases to reach the highest concentration in June to August.

According to "Constituents and Medical Uses of Herbs," the thunberg's geranium is described as following: "The water or alcohol extract of the whole plant increases tension of the intestine. Thunberg's geranium has a clear anti-diarrheic effect. Even if a large amount is taken, there are no side effects and it does not decrease appetite. It kills shigella, typhoid bacillus, and colon bacterium. It is used in the treatment of diarrhea and abdominal pains, and as an anti-diarrheic agent for bloody flux. In the treatment of oriental medicine, the whole plant of the same genus, called "Nogwancho," is known to release the wind energy and facilitate circulation of meridian system to strengthen bones



and therefore, it is used in the treatment of rheumatism, contusion, and stroke."

According to "Illustrated Book of Korean Medicinal Herb" written by Ahn, Deok-kyun, the thunberg's geranium is described as following: "It has a pungent bitter taste and tranquil properties. It eliminates the wind and moist energy and facilitates circulation of meridian system to strengthen skeleton and muscle and therefore, it is used in the treatment of quadriplegia pain, joint separation, and contusion. It is effective for treating shigellosis, chronic diarrhea, abdominal pain, and gastroenteritis, as well as pruritus, scabies, and leprosy. It contains volatile essential oil whose main ingredient is geraniol, kaempferitrin, and tannin components. Its antibacterial and antivirus activities constrain staphylococcus aureus, streptococcus, streptococcus pneumoniae, dysentery bacillus, and epidemic virus."

In organic agriculture, antibacterial and sterilizing effects of the genus of geranium plants, including the thunberg's geranium can be used for a natural pesticide. Cut the above-ground plant from summer to autumn and extract juice from it or infuse it in water for use.

Japanese Andromeda

When cows or horses eat the leaves, they suffer from paralysis due to toxic components in the leaves; hence called “Machuimok” (ma is horse, chui is intoxication, mok is tree). The major toxic components are andromedotoxin and asebotoxin. They are contained in the leaves and lignum and cause the respiratory central paralysis.

Japanese Andromeda (Pieris japonica) is an evergreen shrub in the family Ericaceae. It does not grow in Korea. About 10 species in the genus Pieris are found in Japan, China, and North America. There are also a lot of garden varieties including Japanese Andromeda, variegata, Purity, Formosa, and forrestii.

It grows to 1 to 4 m (3.3-13 ft). The leaves are elliptical-leathery, hard and with serrated margins. The leaves are alternately arranged at the branch but it looks like they are spirally arranged at the tip. In March to May, the white flowers are borne in cluster of raceme on the leaf axil. The flowers are pot-shaped and have the 5-lobed calyx. The fruits are capsular, rounded and borne upward. Depending on the garden varieties, pink or beige flowers are produced.

Cultivation

It is relatively easy to get the fetterbush in farms or garden centers where landscaping trees are sold. It is hard to leave fetterbushes in the open field in the central regions of Korea, but in the southern regions, such as Jeju Island, it is possible to cultivate the plant in the open field. The tolerable winter temperature of fetterbushes is 0 to 10 °C (32-50°F) in general. In the central regions, it

is recommended to place the plant in greenhouse or veranda for winter.

Fetterbushes prefer partially-shaded and relatively moist places. Its reproduces quite well. Propagation is made by cutting, layerage or dividing suckers. In the case of mass-cultivation, seeding is also done to produce sprouts. Even if the buds are formed, they do not produce the flowers in inappropriate temperature and wither away.

Medical Uses

When cows or horses eat the leaves, they suffer from paralysis due to toxic components in the leaves; hence called "Machuimok" (ma is horse, chui is intoxication, mok is tree). The major toxic components are andromedotoxin and asebotoxin. They are contained in the leaves and lignum and cause the respiratory central paralysis.In the wild, horses, cows and sheep can eat fetterbushes and get poisoned. Within 24 hours of ingestion, depression, vomiting, colic,

dyspnea, allgemein krampf, and heart failure occur.

Andromedotoxin, also known as grayanotoxin, is a strong convulsivant, commonly found in the Ericaceae family plants. Andromedotoxin is contained considerably in the royal azalea, as well as rhododendron brachycarpum. It is highly toxic but it effectively drops blood pressure. Therefore, an appropriate amount is used as hypotensive medicines.

The leaves have long been used to kill pest insects and flies in crops. As in the case of the royal azalea, extract juice from the leaves or the entire plant, decoct or infuse it to use it as a natural pesticide.

Shiso

In oriental medicine, the leaves, called "Soyeop," and the seeds, called "Jasoja," are used as medicines to treat sweating, stop cough, strengthen the stomach, improve urination, tranquilize and relieve pain. In case of food poisoning caused by rotten fish or crab, leaf juice extract or leaf decoction is effective.

Shiso (Perilla frutescens var. acuta Kudo) is an annual plant in the family Lamiaceae, also called "Soyeop" or "Chajeugui." Native to China, the perilla has been cultivated in for a long time. It grows to 20 to 80 cm (8-31 in) tall, and the entire plant is purplish and has aroma. The square stem is erect and the leaves are arranged in opposite pair and broad-ovoid. The petiole is long and both sides of the leaf are covered in hairs. In particular, the vein under the leaf is covered in long hairs.

The pale purple flowers are borne in August to September in raceme at the end of the stems and branches. The flower beak is short-tubular with the lipped-tip; the lower lip is longer than the upper lip. The fruit is a follicle, rounded, 1.5 mm (0.6 in) in diameter, and wrapped by the calyx. The shiso with the green leaves, instead of the purple leaves, is called "Cheongsoyeop" (Perilla frutescens for. viridis Makino). Cheongsoyeop has white flowers and stronger aroma than shiso.

Cultivation

Cultivation is made by seeds. You can directly sow the seeds in the field or grow the seedlings and transplant them into the main field; mostly cultivation is made by transplanting. It is important to transplant good quality seedlings at an early stage and make them prosper as soon as possible. Choose species with good aroma.

Harvest the whole plant including the stem or the leaves only. As the shiso absorbs fertilizer very well, adding more fertilizer may make the plant lush but too much fertilizer generates more fallen leaves, which leads to decrease in production. Shiso hardly ever suffers from diseases. The plant is hardly ever damaged by pests but cabbage armyworm, rice stem borer, aphid or red mite may cause harm.

Medical Uses

In oriental medicine, the leaves, called Soyeop, and the seeds, called Jasoja, are used as medicines to treat sweating, stop cough, strengthen the

stomach, improve urination, tranquilize and relieve pain. In case of food poisoning caused by rotten fish or crab, the leaf juice extract or the leaf decoction is effective.

According to "Constituents and Medical Uses of Herbs," "The whole plant has about 0.5 % essential oil. Major components of the essential oil include 60% of l-perillaaldehyde, the aromatic component of the shiso, and 10 to 30% of l-limonene. There also is a small amount of α-pinene, dehydrocumin, and aldehyde. The seeds contain 300mg% of oil and vitamin B1. The major ingredients of oil are linoleic acid and linolenic acid. A small amount of glycerides (stearic acid and palmitic acid) and insaponificated sterol are also found. Perillaaldehyde is 200 to 2,000 times sweeter than the candy and has antiseptic effects."

When the shiso is treated with alkali and steam-distilled, perillaaldehyde is generated. It is a liquid with unique aroma of shiso and used for cookies, beverages, liquors, toothpastes and tobacco as a sweetening or flavoring agent.

According to "Dictionary of Oriental Medicines," the whole plant of the shiso and its seeds are described as following: "Jaso, the leaf: Cut the whole

plant in late summer and dry it up in shade. It has a pungent taste and warm properties. It acts on the lung, spleen, and stomach meridians. It generates sweat to eliminate wind-chill and facilitate circulation of energy in the spleen and stomach. It tranquilizes the fetus and neutralizes fish poison.

In pharmacological tests, it was associated with reducing fever, strengthening the stomach function, constraining viruses, and antiseptic effects. It is used in the treatment of symptoms of wind-chill, bloated feeling caused by blocked energy in the spleen and stomach, vomiting and diarrhea, coughing and shortness of breath caused by cold energy-driven myalgia, vomiting of pregnant women, risk of miscarriage caused by blocked energy, and fish poisoning. Take 6 to 12 g a day as a decoction. As the shiso leaves show stronger ability to treat the surficial symptoms than the whole plant, sometimes only leaves are used as medicine. However, the shiso leaves are not used when the body surface is weak due to light fever.

Jasoja, the seed: Cut the whole plant when the seeds are ripe in autumn and dry it up in sun. Shake off the seeds to remove impurities. It has a pungent taste and warm properties. It acts on the lung. It loosens the sputum, stops cough, and relieves shortness of breath. It is mainly used in the treatment of coughing and shortness of breath caused by sputum, as well as vomiting and constipation. Take 6 to 12 g a day as a decoction, powder or pill. Shiso frutescens seeds can also be used for the same purpose of Jasoja."

Antibacterial and antiseptic effects of the shiso have been proved in many studies. It is possible to use shiso as a natural pesticide in organic farming. Decoct or infuse the whole plant of the leaves in water of alcohol for extraction.

Curly Dock

Young leaves are edible. People unable to take a meal because of diarrhea caused by weakened spleen and stomach should avoid taking the curly dock. The plant is also used as dye. In organic agriculture, anti-insect and sterilizing effects of this plant, which is common in the genus Rumex, are used effectively as natural pesticide.

The plants that belong to genus Rumex are perennial herbs in the Polygonaceae family, commonly growing in humid areas in all parts of Korea. Rumex acetosella, the sorrel species, is dioecious and has spear or arrow-shaped underleaf. Rumex domesticus, the rhubarb species, does not have wart-resembling bumps on the fruit wing. Rumex crispus, Rumex japonicas, Rumex obtusifolius and Rumex nipponicus, the curly dock species, have bumps on the fruit wing.

The garden sorrel (Rumex acetosa L) grows to 30 to 80 cm (12-31 in) tall and the leaves are arranged alternately. The margin is smooth and the petiole gradually disappears as it goes up. The leaves look like spinach and have a sour taste. It is dioecious and the tiny red flowers are spirally borne in panicle in May to June. The fruits have 3 bulbous wings wrapping the seeds.

The curly dock (Rumex crispus L.) has larger leaves than the garden sorrel. The long-elliptical root leaves have long stalks and crumpled margins. The stem leaves are alternate with narrowed ends and crumpled margins. The pale green flowers are borne in June to July in layered form. The fruit wing is ovoid or heart-shaped and it has wart-shaped bumps on the surface with almost no serrate.

Cultivation

It is easy to get the plant nearby. Propagation is made by seeding or dividing suckers. For seeding, collect the seeds before they drop off and sow them immediately or in the next spring. For dividing suckers, divide the roots and plant

them in autumn or spring. Moist soils are suitable for growth.

Medical Uses

The young leaves are edible. The garden sorrel has a sour taste. It contains acetic acid and a large amount of ingestion may lead to poisoning. People unable to take a meal because of diarrhea caused by the weakened spleen and stomach should avoid taking curly dock. The plant is also used as dye where the dried root is mostly used. Sometimes the leaves or the stems are used too. Even a small amount of the plant can generate dark and vivid color as a dye.

The garden sorrel root contains 7.6 to 27.5% of tannin, 193mg% of chrysophanein and hyperin. The leaves contain vitexin, quercetin-3-galactoside, violaxanthin and vitamin C, tannin, potassium oxalate and tartaric acid.

The curly dock root contains chrysophanic acid, emidin, a derivative of oxyanthraquinone, nepodin (2-acetyl-1.8-dihydroxy-3-methyl-naphthaline), tannin, and oxalic acid.

According to "Constituents and Medical Uses of Herbs," the garden sorrel is described as following: "The root decoction is used in the treatment of diarrhea, bloody flux, intestinal asthenia and gastritis. It is also used as antidiarrheics, diuretics, and diaphoretics. The whole

plant is used to treat nephrolithiasis, jaundice and vitamin deficiency. It is used to stop vaginal bleeding as a hemostatic, to reduce fever and treat tuberculosis as a fever reducer. The leaf extract is used as a painkiller to treat rheumatism and waist pains. It is also used as an anti-inflammatory drug for snake and animal bites, as well as various skin diseases including eczema. In the treatment of oriental medicines, the pounded root is applied to scabies and other skin diseases. In folk remedy, it is used to treat ascariasis, oxyuriasis, and ancylostomiasis."

According to "Dictionary of Oriental Medicines," the curly dock is described as following: "Dig out the root in autumn and rinse it with water and dry it up. It has a bitter pungent taste and cold properties with a little bit of toxicity. It facilitates bowel movement, neutralizes poisons, stops bleeding and kills parasites. In the test, it was revealed that it has sterilization and astriction effects. Sterilizing effects are derived from anthraglucoside and tanninglucoside. When a large amount is taken, diarrhea may occur because of anthrachinon compounds. It is used in the treatment of constipation, hematemesis, diarrhea, shigellosis, vomiting, eczema, scabies, pruritus, and lichen."

In organic agriculture, anti-insect and sterilizing effects of the plants that belong to the genus Rumex, such as the garden sorrel and the curly doct, are used effectively as a natural pesticide. Extract juice from the root or the whole plant, decoct them with water or infuse them in alcohol for use. The plant has sustainable prevention and treatment effects on powdery mildew.

Chinese Lizards Tail

The whole plant, called "Sambaekcho," and the rootstock, called "Geun-sambaekcho," is used for medicinal purposes. It has a bitter pungent taste and cold properties. It eliminates bad energy of moist fever, reduces swelling and neutralizes poison. It is used in the treatment of edema, beriberi, jaundice and more.

Chinese lizards tail (Saururus chinensis (Lour.) Baill) is a perennial plant in the Saururaceae family, growing in Korea, as well as Japan, China and the Philippines. It mostly grows in wetlands to 50 to 100 cm (20-40 in) tall. The white rootstock is trailing sideward. The leaves are alternate, ovoid-elliptical with the smooth margins. 2 to 3 leaves on the upper area of the stem is whitish.

The petiole is broadened at the bottom to surround the stem.

In June to August, white flowers are borne in spike. The inflorescence is 10 to 15 cm (4-6 in) long and in opposite to the leaves. The flower is covered in curled hairs that droop down and then come up again. There is no petal and 6 to 7 stamens. The pistil consists of 3 to 5 carpels. The fruits are rounded and usually contain one seed in each chamber. The name "Sambaekcho" comes from the fact that the root, leaves and flowers are white or 2-3 leaves on the top turn white (sam is three, baek is white, cho is plant).

Cultivation

It usually grows in well-ventilated partial-shade in moist valleys such as Mt. Halla and Mt. Jiri. Its preferred habitats are moist, fertile soil. It is widely cultivated as the leaves, as well as the flowers, are ornamentally valuable and used for medicines in various ways. Cultivation in pots is also possible.

Propagation is made by seeding or root division. For seeding, collect the seeds in October and sow them immediately, or store them at room temperature or in a refrigerator and sow them in the next spring. For root division, cut the roots and plant them in September to November, or divide the root nodes and plant them when the bud appears in early spring. It is relatively easy to culture as it is quite free from diseases and pests.

Medical Uses

The whole plant, called "Sambaekcho," and the rootstock, called "Geunsambaekcho," is used for medicinal purposes. Collect the whole plant in July to September and dry it up in sun. Remove dirt from the rootstock and soak it in hot water for a couple of minutes and dry it up in sun.

"It has a bitter pungent taste and cold properties. It eliminates bad energy of moist fever, reduces swelling, and neutralizes poison. It is used to treat edema, beriberi, jaundice, hesitancy in urination and murky urine, bones and sinews, shigellosis, leucorrhea, carbuncles, and furuncles. Take 11 to 19 g a day as decoction or the plant juice extract. For external uses, apply the pounded plant to the affected areas

or rinse the affected area with the decoction."

The whole plant contains essential oil and its major ingredient is methyl-n-nonyl-ketone. The stem contains 1.722% of hydrolyzed tannin. The leaves contain quercetin, quercitrin, isoquercitrin, avicularin, hyperin, rutin, and hydrolyzed tannin (0.544%). Quercetin and quercitrin is a kind of flavonoid and has antibacterial and antioxidation effects.

In organic agriculture, the Chinese lizards tail, along with Heartleaf Houttuynia, can be used as a natural antimicrobial agent. Dry the whole plant and decoct in water or infuse in alcohol or extract fresh juice.

Asian Cooperleaf

It is not only very tolerant to herbicides but it also has a dormant period. Therefore, germination is made continuously throughout the year as the seeds do not germinate in a fixed manner. The fresh sprout is edible as a vegetable dish and is also used as feedstuff. In folk remedy, the pounded plant is applied to the affected area. It is effective for treating shigellosis and bleeding.

Asian cooperleaf (Acalypha australis L.) is an annual plant in the family Euphorbiaceae, commonly growing in fields, meadows and empty areas. It is also

found in China, Japan, Russia, and the Philippines. It grows to 30 to 50 cm (12-20 in) tall. The entire plant is covered in fine hairs and has an erect branch. The leaves are alternate, ovoid or elliptical and with acute tips and bluntly serrated margins.

The inflorescence is borne from the leaf axil in July to August. The male flowers are produced in spike at the upper area and the female flowers are borne under the male inflorescence, surrounded by the bract. Sometimes, the female flowers are borne over the male inflorescence. The bract is triangular-ovoid, brown, and serrated. The fruits are capsular and covered in hairs. The seeds are broad-ovoid and ripen dark brown in September.

Cultivation

Commonly found at roadsides, farm edges and empty sites around residence, the Asian cooperleaf, along with common crabgrass, goosefoot,

purslane, and Amuricus, is a bothersome weed frequently grown when cultivating crops. It is not only very tolerant to herbicides but it also has a dormant period. Therefore, germination is made continuously throughout the year as the seeds do not germinate in a fixed manner. For propagation, collect the matured seeds and sow them immediately. Or store them at low temperature and sow them in spring.

Medical Uses

The fresh sprout is edible as a vegetable dish and is also used as feedstuff. In folk remedy, pounded plant is applied to the affected area. It is effective for treating shigellosis and bleeding.

In oriental medicine, dried whole plant, called "Cheolhyeon" is used for medicinal purposes. Collect Cheolhyeon in May to July, brush dirt off from the plant, and dry it in sun. The whole plant contains alkaloid glycosides, reducing sugar or other reductants, tannin components, starch, fats or lead. It reduces fever, facilitates circulation of water, kills parasites, and stops bleeding.

According to "Constituents and

Medical Uses of Herbs," the Asian cooperleaf is described as following: "The whole plant contains alkaloid and flavonoid. In folk remedy, the whole plant is used as hemostatic, anti-inflammatory drug, and diuretics. The decoction is used in the treatment of gastroenteritis, shigellosis, bacillary dysentery, amoebic dysentery, hematemesis, melena, and vaginal bleeding. Rinse the affected area with the decoction for dermatitis and eczema. Decoct 30 to 60 g with water for ingestion. In folk remedy, the whole plant is used for hematemesis, wounds and swelling as hemostatic, germicides and antidotes."

In organic agriculture, anti-insect effects of the Asian cooperleaf can be used for making natural pesticide. Extract juice from the whole plant, or dry up the plant and decoct it, or infuse it in alcohol for use.

Japanese Hop

The Japanese hop is an annual vine, very commonly found at roadsides, around the field or at the forest rim. It is one of typically bothersome weeds that damage the crops and orchards. It is dioecious and propagated by seeds. The fresh sprout is edible and the whole plant, called "Yulcho," is used for medicinal purposes. Collect the plant in summer and autumn and dry it in sun.

Japanese hop (Humulus japonicus Sieboid & Zucc.) is an annual plant in the family Cannabaceae, commonly growing in the field or empty sites of all parts of the country. The main stem is covered in hairs and the petiole has the hook-shaped coarse thorns facing downward. Mostly, it ascends by coiling other

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objects. The leaves are in opposite pairs, palm-shaped, 5 to 7-lobed, and have serrated margins. Both sides are covered in coarse hairs.

The flowers are dioecious and borne in July to August. The male flowers have 5 calyx pieces and stamens and are borne in panicle. The female flowers are in spike and the bract grows big after the flowers bloom. They are ovoid-ovate and the under-leaf and the margin are covered in hairs. The fruits ripen in September to October. The ovoid fruit is an achene and the center area rises up like lens. The fruit is yellow-brown and has hairs in the upper area.

Cultivation

The Japanese hop is an annual vine, very commonly found at roadsides, around the field or at the forest rim. It is one of the typically bothersome weeds that damage the crops and orchards. It is dioecious and propagate by seeds. To stop propagation, the easiest way is to remove the young sprouts that appear in spring. No separate cultivation is necessary as the Japanese hop is everywhere in the field.

Medical Uses

The fresh sprout is edible and the whole plant, called Yulcho, is used for medicinal purposes. Collect the plant in summer and autumn and dry it in sun. According to "Grand Dictionary of Chinese Medicines," "It has a sweet bitter taste and cold properties with no toxicity. It reduces fever, facilitates urination, eliminates extravasated blood, and neutralizes poison. It is

used in the treatment of gonorrhea, benign prostatic hyperplasia, malaria, dysentery, shigellosis, tuberculosis, lung abscess, pneumonia, leprosy, hemorrhoid, carbuncles, and scrofula. It facilitates energy circulation of the body from the head to the bottom, helps digest five grains, and aids the five viscera. It eliminates hookworms and prevents acute febrile diseases. The plant is also applied into snake or scorpion bites/stings. It treats insomnia. In case of hemorrhoid, rinse the affected area with the plant decoction."

The whole plant contains luteolin, glucoside, choline, asparagine, essential oil, tannin, and resin. The fruits contain humulone and lupulone. The leaves contain 0.015% of cosmosiin and vitexin. The essential oil contains β-humulene, caryophyllene, α-copaene, α-selinene, β-selinene, and γ-cadinene.

According to "Dictionary of Oriental Medicines," "In pharmacological test, it is found that the Japanese hop drops blood pressure, increases urination, and inhibits gram positive bacillus. It is used in the treatment of fever, thirstiness ac-

companied with a pressure on the chest, malaria, fever by tuberculosis, digestion disorder, acutegastritis, edema, diarrhea, shigellosis, cystitis, urethritis, benign prostatic hyperplasia, urethral calculus, hypertension, furuncle, and abscess. Take 9 to 18 g a day and 60 to 80 g a day in case of fresh plant as decoction or juice extract. For external medicines, apply the pounded plant to the affected area or rinse the affected area with a decoction."

Antibacterial effects of the Japanese hop are confirmed in many studies. Japanese hop hardly ever suffers from damages caused by pest insects. So Japanese hop has potential as a natural pesticide with antibacterial and anti-insect properties. One of the big advantages of the Japanese hop is that it is easily found in the surroundings. Extract juice from the plant or dry it up and decoct it or infuse it in alcohol for use.

Sweet Flag

The leaves and the rootstocks have a unique scent and they are used for bathroom perfume, bath preparation, cosmetics, and soaps. Traditionally, Korean people washed their hair or bathed with the water boiled with the sweet flag on fifth day of fifth month of the lunar calendar ("Dano" day).

Sweet flag (Acorus calamus L.) is a perennial plant in the family Acoraceae, growing in wetlands around the lake or pond. The rootstocks with thick nodes are trailing sideward and the fibrous roots are generated on the bottom. The rootstock is white or pale red and has a unique scent. The leaves are borne from the root tip close together. The leaves are 70 cm (28 in) long and 1 to 2 cm (0.4-0.8 in) wide and have a clear vein in the middle.

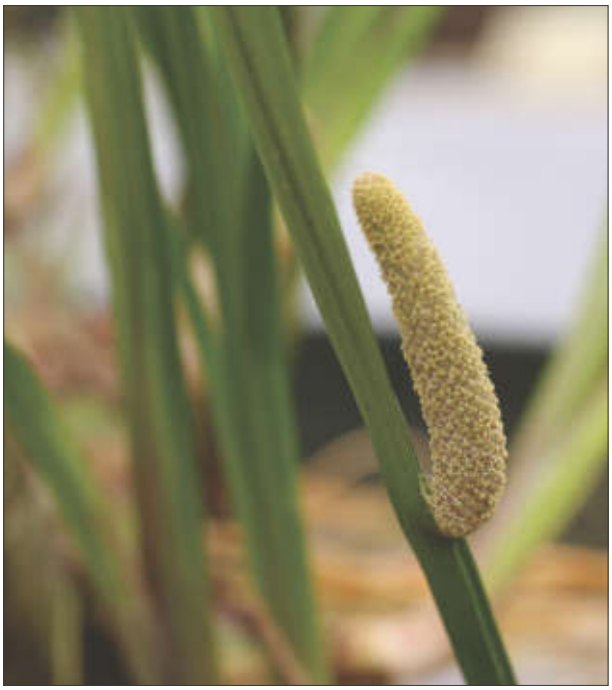
In June to July, the cylindrical inflorescence is borne between the leaves obliquely on the sideway. The flowers are 5 cm (2 in) long and the tiny pale yellow-green flowers are densely packed in cluster. The red fruits are long-elliptical and borne in July to August.

Similar to the sweet flag, there is the Japanese sweet flag (Acorus gramineus Sol.) in the same Acoraceae family. It is an evergreen plant, usually growing around the running riversides, such as the streamside or the mountain valleys in the central-to-southern regions. It grows to 30 to 50 cm (12-20 in) long. Compared to the sweet flag, the leaves of the Japanese sweet flag are thinner and there is no vein in the middle.

Cultivation

The sweet flag grows in shallow water in full sun, at riversides or wetlands; its preferred habitats are moist, fertile, and sunny soil. If you want to culture a small amount of the sweet flag, grow it in a pond or in a pot with almost no drainage. It is good to grow the sweet flag inside the house as it produces a lot of scent. If you want to culture a large amount of the sweet flag, use the artificial wetlands or paddy fields.

Propagation is made by root division or seeding. The root division is always available except for winter. Dig out the root and divide it in early spring or in autumn. Propaga-



tion is easy with root division. However, propagation by seeding is not easy. Collect the seeds in August and soak them in water for 3 days and sow them. As the seeds have a hard skin, it is good to mix and rub them with sand before sowing.

Medical Uses

The leaves and the rootstocks have a unique scent and they are used for bathroom perfume, bath preparation, cosmetics, and soaps. Traditionally, Korean people washed their hair or bathed with the water boiled with the sweet flag on fifth day of fifth month of the lunar calendar ("Dano" day). The sweet flag has warm and pungent properties. In addition to arousing effects, it loosens phlegm, and helps the circulation of energy. The sweet flag can be collected throughout the year, but is best collected in August to October. Remove the fibrous roots from the plant, rinse thoroughly, and dry it in sun.

Major ingredient of the essential oil contained in the rootstock is asarone. Calameone, eugenal, acorin (bitter taste substance), starch, tannin, vitamins, and alkaloid components are also present. The rootstock of the Japanese sweet flag also contains β-asarone, asarone, caryophyllene, α-humulene, sekishone and trans-4-propenyle.

According to "Dictionary of Oriental Medicines," the Japanese sweet flag is described as following: "It has spicy taste and warm properties. It acts on the meridian system of the heart and the pericardium. It clears the head, facilitates circulation of blood and eliminates the wind and moist energy and

phlegm. In pharmacological test, it proved to have stomach-strengthening, light tranquilization, and pain killing effects. In addition, it was also revealed that the sweet flag decoction kills cancer cells. It is mostly used in the treatment of semi-consciousness and forgetfulness. It is also used to treat digestion disorder, deafness, hoarse voice, paralysis, furuncle, abscess, and eczema. Take 2 to 6 g a day as a decoction."

Asarone, the main ingredient of the sweet flag, has tranquilization and pain killing effects as well as antibacterial and anti-insects activities. Therefore, our ancestors washed their hair or bathe with the sweet flag-infused water to prevent dandruff or skin diseases. In India, sweet flag tea is used to exterminate parasite in children.

In organic agriculture, such antibacterial and anti-insect effects of the sweet flag can be used for a natural pesticide. Boil the leaves and the rootstocks or infuse them in alcohol for use.

Sasa borealis

The decoction of the leaves contains a considerable amount of potassium and magnesium. It has antioxidation, anti-diabetic, and antibacterial effects. Some study the possibility of using sasa borealis as natural antibacterial food preservative.

The sasa borealis grows in groups in all parts of Korea in all mountains and all regions in different temperatures. The sasa borealis is short and has thin stem. The leaves resemble the bamboo leaves but they only grow to 1 to 2 m (3.3-7 ft) and 3 to 6 mm (0.1-0.3 in) wide, completely different from the bamboos.

The spike-shaped flowers are covered in hairs and white powder, and are

surrounded by the purple bract. The small catkins have 2 to 3 flowers and have two bracts at the bottom. The flowers are mostly borne in panicle in April. In addition to Sasa borealis, Pseudosasa japonica, Sasa coreana (or Shinidae), and Sasa quelpaertensis are commonly called the mountain bamboos.

Cultivation

It is not necessary to cultivate the sasa borealis as it is easily found around mountains nearby. If you really want to cultivate it, it is recommended to transplant the plant in March to April before the bamboo sprout appears. Cut 4 to 5 heads of the young bamboo, including soils, stretched out from the main bamboo with the cladophyll attached, and transplant it. The sasa borealis prefers partial-shade. Relatively moist, fertile, clay, loamy soils are suitable. The sasa borealis propagates very well. If you set up a concrete enclosure and plant it in there, you can contain the plant from spreading to undesired places.

Medical Uses

The sasa borealis leaves are strongly alkali and have cold properties, slightly sweet taste with refreshing feeling. Major ingredients of the bamboo leaves are phenol,

amino acid, organic acid, and saccharide. Considerable amount of calcium, silicic, vitamin B1 and K are also found. In particular, vitamin K, melted in blood or body fluid clears blood and increases calcium ion, thereby changing the physical constitution.

According to "Illustrated Book of Korean Medicinal Herbs," the leaves are described as following: "It has a sweet and plain taste and cold properties. It is effective for treating a pressure on the chest, uneasiness and constant movement of legs and arms caused by fever in the heart and the stomach, as well as thirstiness. It treats aphthous ulcer and cracked tongue caused by emotional disorder. It is also effective for treating difficulties in urination, abscesses in the mouth and red urine caused by fever."

According to "Dictionary of Oriental Medicines," "The mountain bamboo has a lot of anti-cancer substances and is effective against various diseases. Take the leaves out anytime of the year and dry it up in shade. It has a sweet taste

and cold properties. It reduces fever, improves urination, and helps circulation of lung energy and stops bleeding. In experiments, it was found that the plant has anti-cancer, anti-ulcer, anti-inflammation, tranquilization, and pain killing effects. It also increases acidity of gastric juice, prevents arteriosclerosis, decreases blood pressure, reduces blood glucose contents, neutralizes poison, increases stamina, and inhibits disease organisms."

The decoction of the leaves contains a considerable amount of potassium and magnesium and has antioxidation, anti-diabetic and antibacterial effects. In addition, the sasa borealis is effective for inhibiting various micro-organisms, including tubercle bacillus, colon bacterium, tinea pedis bacillus, virus, trichomonas, and dental caries bacillus. So some study the possibility of using sasa borealis as natural antibacterial food preservative.

In organic agriculture, such antibacterial effects of the sasa borealis are used as a natural pesticide. Boil the plant and infuse it in water for use.

Jerusalem Artichoke (sunroot)

Sunroots generate a sweet taste during storage. Inulin, a major substance of sunroot, is a low-calorie polysaccharide. It moves down to the intestine without being digested by the gastric juice and is transformed into fructose even after digestion, taking the role of insulin without increasing blood sugar.

Jerusalem artichoke (Helianthus tuberosus L.) is a perennial plant in the family Asteracecae, native to North America. Its tubers are commonly cultivated for food or animal foodstuff. It is generally called sunroots. The stem is erect, 1.5 to 3 m (5-10 ft) tall and covered in tough hairs. The leaves in the lower area of the stems are in opposite pairs and the leaves in the upper area of

the stem are arranged alternately. The leaves are long-elliptical with acute tips and serrated margins, and the petiole has wings.

The flowers are borne in September to October. The flower spray is split into many sections at the top and the capitulum is formed at the tip. 11 to 12 ray flowers at the edge of the capitulum are yellow, and the tubular flowers in the middle of the capitulum are yellow, brown and purple mixed together. The involucre is cup-shaped and its pieces are arranged in 2 to 3 rows. The fruit is an achene and has scale-shaped bumps. The tubers are bumpy like gingers.

Cultivation

Its preferred habitats are well-drained, organic matter-rich, sandy, gritty, fertile soils. Humid areas are not recommended. Propagation is made by the tubers. Plant small tubers directly. For big tubers, slice and divide the germinal disks like in potato planting. The best time for planting is late April to early

May. Plant the tubers 10 to 20 cm (4-8 in) deep and 50 to 60 cm (20-24 in) apart. The sunroots are very tolerant to diseases and pests.

The tubers start growing around when the flowers fall off. Harvesting is available when the leaves fall. In winter, it is recommended to bury the tubers in the ground or dig out the tubers on a necessity-base. The tubers become dry soon when they are left outside. As the sunroots consume soil fertility considerably, repeated cultivation does not produce sound tubers.

Medical Uses

The tubers are used for food or animal foodstuff. The tubers contain 12 to 14% of inulin. Inulin is hydrolyzed to manufacture fructose or is used as an ingredient for ethanol. Inulin is also found in plants such as dandelion, burdocks, thistles, dahlia, and onions, but the highest concentration is found in sunroots.

Sunroots contain various enzymes including inulinase, proteinase, invertase,

phosphorylase, and phonolase. Among them, the inulinase enzyme decomposes inulin to produce fructose. That is why the sunroots generate a sweet taste during storage. Inulin, a major substance of sunroot, is a low-calorie polysaccharide. It moves down to the intestine without being digested by gastric juice and is transformed into fructose even after digestion, taking the role of insulin without increasing blood sugar.

According to "China Illustrated Book of Medicinal Herbs," the sunroot is described as following: "it contains cellulose, protein, various organic acids, and inulin, as well as minerals including silicon dioxide, calcium, nitrum, magnesium, aluminum, copper, and iron. It has a sweet taste and cold properties. It reduces fever and facilitates blood circulation to eliminate extravasated blood. It is used in the treatment of fracture, fever of unknown origin and diabetes. Take 10 to 20 g a day as a decoction."

It is known that the sunroots do not have toxic components. Therefore, no research was made regarding efficacy of the sunroots as a natural pesticide. There is no report that inulin, the major ingredient of the sunroots, has anti-insect effects. However, some Jadam members have been using the sunroots as a natural pesticide to exterminate diseases and pests. It is said that the sunroots are especially powerful for exterminating the larvae of moths and butterflies, including the common cabbage butterfly, the major pest of Chinese cabbages, as well as spodoptera exigua, lyonetiidae, and helicoverpa assulta.

Extract juice from the leaves, stems or tubers, boil or infuse them for use.

Taro

Taro's cladophylls and underground tubers are edible. Due to toxicity, the plant is dried up and boiled/infused in rice washed water; it is not eaten uncooked. The astringent taste comes from potassium oxalate; this substance reduces fever and inflammation.

Taro (Colocasia esculenta) is a perennial plant in the family Acoraceae. It has been cultivated for a long time. It is assumed that its native habitats are tropical and subtropical regions in the Southeast Asia from North East India to Myanmar, Malay Peninsular, and South China. It grows to 1.2 m (3.4 ft) tall. The starch containing tubers are grown in the ground. Tubers are ovoid and covered in fibers on surface. Small tubers are attached to the main tubers.

The wide leaves resembling the elephant ears are borne in the long petiole

coming from the tubers. The leaves are hairless and have wave-shaped flat margin. At rare intervals, 1 to 4 flower stems are borne between the petiole and the flowers are produced in August to September, but they do not bear fruits. The green spathe surrounding the flowers is erect and about 30 cm (12 in) tall. The rod-shaped inflorescence produces the male flowers at the top, fake male flowers in the middle and the female flowers at the bottom.

Cultivation

Taro is a subtropical crop. It is difficult to cultivate the taro in cooler central-to-northern regions. The plant relatively prefers areas with high temperature and humidity. Propagation is made by tubers. Bud the taro in spring and plant it immediately to the main field or raise the seedlings and plant them permanently when 2 pieces of foliage leaves appear. The taro is intolerant to dryness but it is very tolerant to diseases and pests.

To grow the stem, collect the stems 10 days earlier than the tuber-harvest-

ing date. To grow tubers, harvest the tubers and the stems at the same time before frost. Peel the stem skin and dry them before storage. Dry up the tubers in shade and store them at low temperature. For long-term storage, dig out a hole and spread rice straws or fallen leaves to about 20 cm (8 in), pile up the taros, and cover soil 30 cm (12 in) thick.

Medical Uses

The cladophylls and the tubers in the ground are edible. For the petiole, peel off the skin and dry up before cooking. The raw stem does not only have a strong astringent taste but it also has toxicity. Avoid eating raw tubers. Boil them in water for soup or powder the dried tubers and make pancake or rice cake.

The tubers contain protein (1.75 to 2.3%), starch (69.6 to 73.7%), inorganic components (1.17 to 1.68%), fats (0.47 to 0.68%), calcium (0.059 to 0.169%), phosphorus (0.113 to 0.274%), and iron (0.0042 to 0.0052%). The content of vitamin C and A is very small but vitamin B1 and B2 (riboflavin) are copious in the tubers.

According to "Dictionary of Oriental Medicines," Toran is described as following; "Toran is the dried tubers of the taro, a perennial plant in the family Acoraceae. They are planted in various regions. In autumn, dig out the tubers, rinse them in water and dry them up in sun. It has a sweet pungent taste and tranquil properties. It acts on the meridian system of the stomach and the large intestine and softens the hard substances. It is used in the treatment of scrofula, furuncle, chronic indigestion, dry patch, and burns. Take 60 to 120 g a day as

herbal infusion. For external use, apply the pounded taro to the affected area or rinse the affected area with the decoction. The roots are used for soup and the leaves are edible as a vegetable dish."

The astringent taste of the taro comes from potassium oxalate. This component reduces fever and inflammation. For contusion, shoulder discomfort, neuralgia, and distortion, powdered taro mixed with flour and water can be applied to the affected area. Excessive accumulation of the potassium oxalate in the body may cause a calculus, so when eating as food, boil them in the rice washed water (or salt water) or add kelp or ginger extract during cooking.

Taro also contains mutin, a sticky mucilage, which is a complex body of sugar and protein. Mutin is transformed into gluchronic acid in the body, strengthening the liver or the kidney. In addition, it facilitates digestion of protein in treating constipation and helps fight anti-aging by revitalizing cells.

Taro leaves and tubers are hardly ever damaged by pest insects because they have toxic components that prevent insects from ingestin them. Toxicity is the reason why people do not consume raw taros and that the hands feel tingling or blister when peeling cladophyll or tuber with bare hands.

The extract of the taro leave, stems, and tubers can all be used as a natural pesticide. Mix into drip irrigation and the taro extract is effective for exterminating agrotis segetum, larvae, white grubs, and mole crickets. Leaf spray is effective for killing aphid, mite, oriental tobacco budworms, and larvae of common cabbage butterflies.

Datura

The entire plant contains alkaloid components. Flowers, seeds, and leaves are used for asthma, anti-convulsion, pain killing, and anti-sicknesses. Take the flowers off when they are borne and dry them up in shade. The alkaloid content increases when the leaves are taken out after drying up the stems.

Datura (Datura stramonium) is an annual plant in the family Solanaceae, native to tropical America. It is cultivated for ornamental purposes in private gardens. It also grows in the wildly. The purple stems produce thick twigs. It

grows to 1 to 2 m (3.3-7 ft) tall. The leaves are ovoid but have coarse large serrates on the margin. The leaves are alternate and have a long petiole.

The flowers are borne in August to September. The pale purple flowers are arranged at the end of the stem or on the leaf axil. The calyx is tubular and the flared corolla is 5-lobed. At the tip of the lobe, a long and sharp bump exists. There are 5 stamens and 1 pistil. The fruits are capsular, ovoid, ripen in October and have a lot of thorn-shaped bumps. The seeds are black. The plant similar to the datura but has the white flower and the green stem and petiole is called Datura metel.

BOTANICAL GARDEN, TABOR, . www.wikipedia.org

Cultivation

As a tropical plant, the datura can be cultivated in any region in Korea in summer while temperature is high. Its preferred habitats are well-drained sandy loamy soils in sufficient sun. Even in a reclaimed land, generous application of fertilizer will secure good growth. In fertile land, stems and leaves prosper but not enough seeds are produced. When you grow the datura to get the seeds, it is recommended to cultivate the plant in relatively poor soil while making use of fertilizer. Propagation is done by seeds.

Medical Uses

The datura is a poisonous plant which has toxicity in its entire body. The flowers, seeds and leaves are used for asthma, anti-convulsion, pain killing, and anti-sicknesses. Take the flowers off when they are borne and dry them up in shade. The alkaloid content increases when the leaves are taken out after drying up the stems. Take the fruits before they split, dry them up in sun and shake off the seeds for collection.

The entire plant contains alkaloid components. The major ingredient of alkaloids is hyoscyamine. A small amount of atropine, scopolamine, apoatropine, and beladonin is also contained. The leaves contain dark brown essential oil that smells like tobacco and tannin. The seeds contain 17 to 25% of oil (about 80% is linolein and olein and the rest is palmitin and stearin).

Overdose causes poisoning. Major poisoning symptoms include red face, anxiety disorders, fast pulse, difficulties in walking, dizziness, hallucination, au-

ditory hallucination, dry mouth, dry throat, mouth paralysis, vomiting, language disorder, corectasis and light areflexia, and in the worst case, high fever, unconsciousness, urine and feces incontinence, and paroxysmal convulsion. There is report of a person dying after eating 5 datura fruits.

According to "Constituents and Medical Uses of Herbs," "The datura (leaves and flowers) is used as spasmolytic drugs for asthma, spastic bronchitis, cough, convulsion of internal organs (gastro-duodenal ulcer, cholecystitis, colitis, liver and kidney colic, spastic constipation), and bradyrhythmia caused by heart disease. In addition, it is used in the prevention and treatment of sea and air sicknesses. Sometimes the datura is used to reduce the secretion of saliva and mucus during facial plastic surgery and the upper airway surgery. In general, the medicines made of the datura contain hyoscyamine and scopolamine for tranquilization. Therefore, it has less adverse side effects than when using atropine alone, it can be used for longer, and its actions is slower."

In organic agriculture, the alkaloid components of the datura can be used as a natural pesticide. Extract juice from the whole plant or make decoction with the dried datura plant.

Wormwood

The whole plant is used for aromatic stomachic, tonic, fever reducer, and choleretic. Wormwood is also effective for repelling harmful insects. Wormwood is one of the major ingredients of the "mothbag" because of its high anti-insect effects.

Wormwood (Artemisia absinthium L.) is a perennial plant in the family Asteracecae, native to Europe and North Africa. In Korea, wormwood is grown as herbal or ornamental plant. It grows to 1 m (3.3 ft) tall at maturity. As it grows, the lower area of the stems is lignified, making wormwood look like a shrub, and a lot of twigs are produced from the bottom. The leaves are alternate

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and 2 to 3 pinnate like the mugwort. As the leaves are covered in a lot of white hairs, the entire plant looks silver-white.

The flowers are borne in summer and a lot of capitulums are borne in panicle like the catkins. The capitulum is 3 to 5 mm in diameters and pale yellow. The fruit is an achene, ovobate, and has no pappus. Varieties include A. pontica or A. maritima. It has the most bitter among all herbs. In China, wormwood is called "Goae" which means bitter (go) mugwort (ae).

Cultivation

Wormwood prefers sunny places but it also grows well in partial-shade. Its preferred habitats are well-drained sandy loamy soils. As wormwood is a strong plant, you can easily cultivate it at home by sowing seeds. Propagation is made

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by seeding or dividing suckers. Sow the seeds in autumn immediately or in the next April. Do not cover soil too thick. Germination is done in 2 to 3 weeks at 15 to 20 °C (59-68°F).

For dividing suckers, dig out the roots in March and divide and plant them. As the head grows big, 60 cm (24 in) is suitable for distance between one division to another. Narrow distance is not good for growth. The best time to collect the leaves is when the flowers start blooming. Completely dry up the leaves in shade and store them in dry conditions.

Medical Uses

The whole plant is used for aromatic stomachic, tonic, fever reducer, and choleretic. It acts on the liver and is effective for treating depression and jaun-

dice. In addition, it reduces fever, inflammation, and toxicity of zinc. In the past, women used to use wormwood as herb because the plant was believed to facilitate menstruation. Wormwood is not used for cooking. Avoid using wormwood during pregnancy and when taking, take it for a short-term.

Absinthe, a distilled spirit made by extracting wormwood in highly concentrated alcohol, was very popular among artists of late nineteenth and early twentieth century because of its strong hallucinating action. Alfred de Musset, a French poet, painters Henri de Toulouse Lautrec, and Vincent van Gogh all lost their lives or killed themselves because of epilepsy seizures caused by intoxication of Absinthe.

Absinthe contains a terpene component, called thujone, which gives a unique aroma to Absinthe but it destroys the brain cells and causes hallucination. It is reported that habitual drinking of Absinthe causes absent-mind, deterioration of mental strength, nervousness, optic neuropathy, or experience of hallucination.

As reflected in its English name, wormwood is effective in repelling "worms" or harmful insects. Wormwood is one of major ingredients for "moth-bag" because of its high anti-insect effects. In particular, it is effective for exterminating nemathelminthes and nematode. Wormwood is also used to kill imago of the dog's heart worm.

In organic agriculture, anthelmintic and anti-insect effects of wormwood can be used as a natural pesticide. Decoct the plant or infuse it in alcohol for use.

Salvia plebeia (Gombobaechu)

The young leaves are edible as a vegetable dish or as Kimchee. Or mix the whole plant with sugar to produce enzymes for ingestion. It facilitates urination, cleans the blood, neutralizes poison in the body, and kills parasites.

Salvia plebeia (Salvia plebeia R.Br.) is a biennial plant in the family Lamiaceae. It mostly grows at the ridges between rice paddies and fallow fields in the southern regions or at the relatively moist edges of small stream or infertile lands near the stream. It passes winter in the form of Napa cabbage. In spring, the erect stem grows to 30 to 90 cm (12-35 in) tall. The stem is square-shaped and has many twigs. The leaves on the stem are arranged alternatively, serrated, long-elliptical and 3 to 6 cm (12-24 in) long. The margin is coarsely serrated and covered in fine hairs.

The pale purple flowers are borne in May to July. The flowers are 4 to 5 mm (0.16-0.2 in) long and arranged in raceme on the leaf axil at the end of the stalk. The in-

florescence is 8 to 10 cm (3.1-4 in) long and densely covered in short hairs. The corolla is lipped and has 2 stamens. The wide-elliptical fruits split. The seeds are so small that they can blow in the wind. The root resembles that of the Napa cabbage but it has more fine roots. Gland spots are on the side of the leaves and petals, producing relatively fishy and icky smell.

Cultivation

Its preferred habitats are well-drained sandy loamy soils in full sun, away from direct contact with cold wind in winter. As it is a biennial plant, you can plant them in empty field after harvest in autumn. As it grows in winter and harvested in spring, the plant does not suffer from diseases and pests. You do not need to add fertilizer or compost. Propagation is made by seeds.

In June to July, when the floral axis turns yellow and the seeds ripen black, cut the plant (like you would perilla) and dry it up in shade. Shake off the seeds

and store them in sealed container in the refrigerator. When the seeds are sown in mid-October, harvesting can begin from early spring of the following year. Germination is hard in dry soils. Give enough water before and after sowing. As the seeds are very small, mix them with sand and scatter them for sowing. It is extremely sensitive to pesticide or herbicide; avoid use.

Medical Uses

The young leaves are edible as a vegetable dish or as Kimchi. Or mix the whole plant with sugar to extract enzymes for ingestion. To use the small flowered sage for medicines, cut the whole plant in March to May and dry it up in sun. The whole plant contains flavonoid, including homoplantaginin, hispidulin, eupafolin, and eupafolin-7-glucoside. In addition, phenolic compound, essential oil, saponin, cardiac glycoside, unsaturated sterol, and polyterpene were also identified.

It has a spicy taste and tranquil or cool properties without toxicity. It facilitates urination, cleans the blood, neutralizes poison in the body, and kills parasites. It is effective for treating hematuria, hemoptysis, vaginal bleeding, hydrops abdominis, murky urine, sore and painful throat, tonsillitis, cold, carbuncles, hemorrhoid, metritis, menstrual irregularity, feeling of cold, and contusion.

According to researches, the Salvia plebeia's alcohol extract is effective for inhibiting staphylococcus aureus, sarcina, and hay bacillus, and the plant decoction is effective for stopping or killing leptospira.

In organic agriculture, such sterilizing effect of the Salvia plebeia (Gombobaechu) can be used as a natural pesticide. Extract juice from the whole plant, infuse it in alcohol or decoct it with water for use.

Kobushi Magnolia/Oyama Magnolia

The flower bud of Kobushi Magnolia or Oyama Magnolia is called "Shini" in oriental medicine. Collect the plant before the flower bud is open and dry it up for use. The plant is used for tea or medicines. It is used in the treatment of stuffy nose and sinus infection caused by cold energy and wind in the body.

Kobushi Magnolia (Magnolia kobus A.P. DC.) is a tall deciduous tree in the family Magnoliaceae, growing up to 10 m (33 ft) tall. The bark is grayish white and the leaves are alternate, broad-ovoid or obovate and with acute tips and plain margins. In March to April, the flowers are borne before the leaves appear. There are 6 to 9 white petals and the lower areas of the petal are pale pink.

There are 3 calyxes and 30 stamens. The fruits ripen in September to October and split open to produce orange-colored seeds.

Magnolia sieboldii K. Koch is commonly called Oyama Magnolia. It grows to 7 m (23 ft) tall and is mostly found at the mountain valleys. A lot of small stems are produced from the main stem sideward. The leaves are alternate and obovate. The white flowers are borne in May to June. After the leaves are produced, they bloom drooping downward and have wonderful scent. There are 6 to 9 petals. The fruits are elliptical and ripen in September and the thread-hanging seeds are produced.

Cultivation

It is very cold-hardy and prefers in well-drained soils. It is hard to transplant most of magnolia species but transplantation is relatively easy for Kobushi magnolia. Kobushi magnolia does not produce flowers or bear fruits

in shade. On the contrary, Oyama magnolia grows well in partial-shade. Propagation is made by seeding or cutting.

For seeding, the seeds should not be dried as dry seeds hardly ever germinate. Collect the matured seeds in autumn and sow them immediately or store them in the open field or wrap the seeds by vinyl or paper and store them in a refrigerator before sowing in the next spring. The seeds are germinated in 30 days in general. For cutting, use the new branch produced in spring and autumn.

Medical Uses

The flower bud of Kobushi Magnolia or Oyama Magnolia is called "Shini" in oriental medicine. Collect the plant before the flower bud is open and dry it for use. The plant is used for tea or medicines. It is used in the treatment of stuffy nose and sinus infection caused by cold wind energy in the body. It is also effective for treating runny nose, headache or decreased awareness, chills, fever, pantalgia and cough with a lot of discharge. It is reported that the plant is effective for astriction, capillary expansion, anti-inflammation, blood pressure decrease, pain killing, tranquilization and inhibi-

ition of dermatophyte and staphylococcus.

According to "Illustrated Book of Korean Medicinal Herb" written by Deok-kyun An, Oyama magnolia is described as following: "It is the flower bud of Oyama magnolia, a tall deciduous tree in the family Magnoliaceae. In fresh plant medicine, it is called Cheonnyeomokran. It has bitter taste and cold properties. It improves urination and reduces swelling. It strengthens the lung and stops coughing. It also treats coughing caused by pneumonia, bloody sputum and reduces furuncles. In folk remedy, the leaves are decocted with 'dongquai' for blood nourishment."

Mugwort

The fresh sprouts are edible in the form of a rice cake or a bean paste soup. It is known that the mugwort collected and dried around Dano (the fifth day of the fifth month of the year according to the lunar calendar) is the most potent for medical purposes. Mugwort is used in the treatment of abdominal pains, diarrhea, vomiting, and hemostasis. It is also effective for treating menstrual irregularity or vaginal bleeding.

Mugwort (Artemisia princeps Pamp.) is a perennial plant in the family Asteracecae and is the most common in the mugwort family. It mostly grows at the meadow or roadsides in full sun. The entire plant is covered in spider web-like hairs and the rootstocks stretching sideward grow in cluster. It grows to 60 to 120 cm (24-48 in) tall at maturity. The stems and leaves are arranged alternately and 2 to 4-pair-lobed. The leaves attached to the spike are linear.

The pale red purple flowers are borne in July to September. The capitulums

formed by tiny flowers are arranged in one-sided weighted in panicle. The fruit is an achene and ripens in October.

In addition to the mugwort, about 60 kinds of mugwort species grow in Korea, including Artemisia japonica, A. selengensis, A. apiacea, A. capillaris, A. mongolica, A. iwayomogi and A. messerschmidtiana. They are classified by the size of capitulum and the shape of the leaves but it is not easy to distinguish because they look similar.

Cultivation

Its preferred habitats are well-drained sandy soil in enough sun. But it also grows well in slightly shady places. Propagation is made by seeding, root division or cutting. For seeding, mass-propagation is available but in such a case, it is hard to maintain the trait of the species and germination is not easy, either.

For root division, dig out the subterranean stems in March to April and cut them 3 to 5 cm (1.2-2 in) in size and scatter them in the field. Or plant them 15 to 20 cm (6-8 in) in distance from all four directions and cover them with straws. Harvest the plant around Dano in May and dig out the root for propa-

gation in wider area. For cutting, cut the relatively hardened stems of the current year in early May to early June 8 cm (3.1 in) long and put them in water for 1 to 2 hours for propagation.

Medical Uses

The fresh sprouts are edible in the form of a rice cake or a bean paste soup. It is known that the mugwort collected and dried around Dano (the fifth day of the fifth month of the year according to the lunar calendar) is the most potent for medical purposes. Mugwort is used in the treatment of abdominal pains, diarrhea, vomiting, and hemostasis. It is also effective for treating menstrual irregularity or vaginal bleeding. The mugwort, in oriental medicine, is called Aeyeop, Ae or Aecho.

According to "Constituents and Medical Uses of Herbs," the whole plant contains essential oil, tannin, resin, bitter-tasting substances, artemisinin, ascorbic acid, and carotin. The leaves contain essential oil, cineol, thujon, borneol, paraffin, adenine, choline and vitamin A, B, D.

The unique aroma from the mugwort comes from cineol, an essential oil component. 50% of the essential oil components in the mugwort consist of cineol. Being insoluble in water, it dissolves well in ether, ethanol, and chloroform. This substance is found in eucalyptus, where more than 90% of the vegetable aromatic oil is cineol. It is also present in laurel leaves, basil flower, rosemary, sage, and aromatic plant leaves.

With its soft and sweet aroma and taste, cineol is used for spice, perfume

and cosmetics, as well as an ingredient for mouth wash or cough suppressant. With its antibacterial and anti-insect effects, cineol is used for treating asthma, alleviating inflammation, and killing leukemia cells.

According to "Donguibogam (Eastern Medical Manual)," Aeyeop (leaf) and Aeshil (seed) is described as following: "It has warm properties (or hot properties) and a bitter taste without toxicity. It treats several chronic diseases and atypical vaginal bleeding, tranquilizes pregnancy, stops abdominal pains, treats bloody flux and diarrhea alba. It treats bleeding caused by anal fistula and furuncles in the lower body, granulates the flesh, removes wind-chill and helps getting pregnant.

It is also called 'Bingdae' or 'Yeocho.' It is found everywhere but the mugwort that grows by the roadsides is the best. Collect the leaves in early March or early May in the lunar calendar and dry them up in sun. Only aged leaves can be used for medicinal purposes. The raw leaves have cold properties and the washed leaves have hot properties [Boncho]. It is recommended to collect the leaves on Dano before sunrise without talking. Pound the leaves and sift them. Throw away the green residues and get the white substances. Add a small amount of sulfur and make a moxibustion to burn moxa [Ipmoon].

Aeshil (mugwort seeds) brightens the eyes, treats any mental illnesses, improves the stamina, strengthens the kidney, waist and knee, and warms up the uterus [Boncho]."

In organic agriculture, antibacterial components contained in mugwort are used for a natural pesticide. Boil the whole plant or infuse it in alcohol for use.

Coffee

Caffeine contained in coffee is an alkaloid component that paralyzes or kills the insects that nibble away the plant. A small amount of caffeine acts on the central nerve, increasing physical and mental alertness and helping fatigue recovery. However, excessive consumption causes anxiety, excitement, and insomnia.

Coffee tree is an evergreen tree in the family Rubiaceae, native to Ethiopia and Congo and mostly growing in the tropical regions between 25 degrees southern latitude and 25 degrees northern latitude. There are a variety of species of the genus Coffea but Coffea arabica L, C. robusta Linden, and C. liberica Bull are mainly cultivated. Coffea Arabica, which has an excellent taste and aroma and relatively low caffeine content (1.4%), occupies 70% of the world's coffee production.

Some species grow to 6 to 8 m (26 ft) or even over 10 m (33 ft), but the plant is usually managed within the height of 2 m (7 ft) for easy harvesting. The leaves are in opposite pairs, long-elliptical, thick and glossy. White flowers are borne on the leaf axil in group of 3 to 7

and they smell good. 6 to 11 months after the flowers fall off, fruits ripen red in the shape of cherry. Two pairs of green bean are found inside the fruit.

Cultivation

Coffea Arabica has excellent taste and aroma but it is picky in terms of cultivation conditions and is susceptible to diseases and pests. The preferred average temperature for cultivation is 15 to 24°C (59-75.2°F), and its preferred habitats are organic substance-rich, well-drained volcanic ash soils in the hill sections over 800 m (2,600 ft) altitude where rainy and dry seasons are distinct.

On the other hand, C. robusta Linden tolerates relatively wide ranging climates and soil conditions in regions below 600 m (2,000 ft) altitude as long as the temperature can be maintained in the range of 24 to 30°C (75.2-86°F). This variety is resistant against diseases and pests. Coffea robusta is less picky compared to Coffea Arabica in terms of cultivation conditions. But its taste and aroma are inferior to Coffea Arabica; Coffea robusta is mainly used for ingredi-

ents of blending coffee or instant coffee. The caffeine content of Coffea robusta is twice as high as Coffea arabica.

For propagation of Coffea Arabica, raise the seedlings in seedbed and move to the main field after half a year. For coffea robusta, sow the seeds directly in the ground. The flowers bloom 2 to 4 years later. It takes 6 to 9 months from the flowering to the harvesting for coffea Arabica, and 9 to 11 months for coffea robusta. Pruning is recommended in every 5 to 7 years to prevent the tree from overgrowing and to secure stable yield.

Medical Uses

The coffee green beans, although it varies depending on the production regions and cultivation environment, contain polysaccharide (37 to 55%), lipid (11 to 13%), organic amino acid (11 to 16%), protein (4 to 5%), minerals (3 to 5%), fatty acid (about 2%), chlorogenic acid (1%), trigonelline (1%), and caffeine (1%), in general.

Caffeine is an important component that determines characteristics of coffee. It is a white crystal with bitter taste. Caffeine is not only contained in the coffee bean, but it also can be found in the tea leaves, cocoa, cola, Mate tea and guava fruits. Caffeine contained in coffee is an alkaloid component that paralyzes or kills the insects that nibble away the plant.

A small amount of caffeine acts on the central nerve, increasing physical and mental alertness and helping fatigue recovery. However, excessive caffeine consumption causes anxiety, excitement, attention deficiency, headache, hallucination, and insomnia, and even leads to unstable pulse. As caffeine also contracts the blood vessel, it is recommended that the people with hypertension or cerebral arteriosclerosis should not drink coffee too much. In addition, caffeine increases secretion of gastric acid. Ingestion of too much caffeine for a long time may cause gastric ulcer, erosive esophagitis, and reflux esophagitis.

Trigonelline is also an alkaloid substance that produces a bitter taste but its toxicity is only a quarter of caffeine. Chlorogenic acid is a kind of polyphenol compounds producing the unique color of the coffee beans. It suppresses generation of lipoperoxide and biosynthesis of cholesterol. It also has anti-oxidation, anti-cancer, and antibacterial effects.

In organic agriculture, anti-insect and antibacterial components contained in coffee, such as caffeine, trigonelline, and chlorogenic acid, can be used as a natural pesticide. Dilute coffee with water for use.

Clematis

In oriental medicine, the plants that belong to the genus clematis are called “Wiryeongseon” and are used for medicinal purposes. They release wind energy, eliminate moisture from body, and facilitate fast energy circulation in the meridian system. They are mainly used in the treatment of aching caused by wind, cold, and moisture that invaded the body, muscular paralysis, joint paralysis, muscular dystrophy, neuralgia, rheumatism, hands and legs paralysis, and gout.

About 20 species of the genus clematis in the family Ranunculaceae grow in Korea, including Manchurian clematis, Clematis apiifolia, C. koreana, C. heracleifolia and C. trichotoma.

Clematis (Clematis apiifolia DC.) is a climbing plant with falling leaves, commonly growing at the mountain foot. The leaves consist of 3 leaflets and

have a long petiole. The leaflet is ovoid with a coarsely serrated margin. The white flowers 13 to 25 mm (0.5-1 in) in diameter are borne in June to September on the leaf axil in the form of an umbrella. The fruits ripen in September to October. They are covered in white or light brown hairs about 1 cm (0. 4 in) long.

Manchurian clematis (Clematis terniflora var. mandshurica) is also a climbing plant with falling leaves, commonly found at the mountain foot. It grows to 2 m (7 ft) and the leaves are in opposite pairs. The leaves consist of 5 to 7 leaflets. The ovoid leaflets do not have any hair on either sides and the margin is plain. In June to August, the white flowers are borne at the end of the main stem and on the leaf axil, and the fruits are ripe in September. Clematis patens produces a large flower 10 to 15 cm (4-6 in) in size and its fruit is uniquely shaped like a disk.

Cultivation

Its preferred habitats are places with full sun. As the clematis is a climbing plant, there should be a support to allow the plant to climb on. Propagation is

made by seeding or cutting. For seeding, collect the matured seeds in September to October and immediately sow them. Or store the collected seeds in the refrigerator and sow them in early spring. As the seeds are hard, soaking them in water for 3 to 4 days will promote germination. As the seeds are covered in feather-like hair, scatter them from above and cover them with shallow soil. For cutting, cut and plant the branch of the current year in autumn, or divide and plant the root in early spring.

Medical Uses

In oriental medicine, the plants that belong to the genus clematis are called "Wiryeongseon" and are used for medicinal purposes. Clematis is sometimes called "Yeowi" and its ingredients and efficacy are similar to the Manchurian clematis. They release wind energy, eliminate moisture from body, and facilitate fast energy circulation in the meridian system. They are mainly used in the treatment of aching caused by wind, cold, and moisture that invaded the body, muscular paralysis, joint paralysis, muscular dystrophy, neuralgia, rheumatism, hands and legs paralysis, and gout. It is also used as hemagogue for menstrual irregularity, as well as in the treatment of tonsillitis and fish bone stuck on the throat.

Major ingredients are anemonin, anemonol, saponin, and phenols. Anemonin is transformed from protoanemonin and is commonly found in the plants that belong to the family Ranunculaceae, such as Korean Pasqueflower

and Ranunculus Sceleratus. A small amount of protoanemonin stimulates the central nervous system and enhances functions of the reticulo-endothelium system, but its toxicity causes dermal inflammation and necrosis of cells. In addition, protoanemonin has antibacterial effects on staphylococcus, gram positive bacillus, negative bacillus and candida fungus. It also kills malaria or amoeba protozoa.

According to "Dictionary of Oriental Medicines," "Wiryeongseon" is described as following: "Dig out the root in autumn and spring, rinse it in water and dry it up in sun. It has a bitter taste and warm properties. It acts on all twelve hard pulses but mostly on the meridian system of urinary bladder. It eliminates wind and moist energy from the body, loosens sputum, facilitates circulation of energy, and stops pains.

In pharmacological tests, it was found that the decoction acts on the central nerve, especially showing a stimulant action on the respiratory central nerve, as well as pain killing effects. The steam-distilled plant liquid is effective for paralysis recovery. It is used in the treatment of aching caused by wind, cold and moisture invasion of the body, waist and knee pains, quadriplegia, cold feeing in abdomen and abdominal pains, beriberi, abdominal lump, and lump in flank area. It is also used for rheumatoid arthritis and neuralgia. Take 6 to 12 g a day as a decoction, infusion in alcohol, powder or pill."

In organic agriculture, the whole plant is used as a natural pesticide. Extract juice from the whole plant including the stems and leaves, decoct them with water or infuse them in alcohol for use

Turmeric

Turmeric is an ingredient of curry. It has been used as food in India for a long time. Its other uses include yellow dye, food coloring agents, and medicines. Slice the raw turmeric into the thin pieces and boil them to take as drinking water. Or drink its juice extract or make tea.

Turmeric (Curcuma longa L.) is a perennial plant in the family Zingiberaceae, native to the subtropical regions such as southern China and India. It has been cultivated in various regions of Asia as colorant, medicinal herb, and food for a long time. The history of turmeric in Korea is also very long; its record is found in "Sejongsilrokjiriji" and "Shinjeungdongkukyeojiseungram." 4 to 8 wide leaves resembling the leaves of plantains or cannas are produced from the ginger-shaped tubers in the form of bundle and grow to human height. The leaves have clear veins.

In early autumn, the greenish white inflorescence grows to 20 cm (8 in) tall and the dark yellow flowers are borne at the end of the bract. Turmeric looks similar to the wild turmeric (C. aromatica salisb.) that produces the pink flowers in spring. However, compared to turmeric, wild turmeric has less yellow tubers and its under-leaf is covered in fine hairs. The name "Ulgeum" comes from the fact that the color of liquor would turn gold when turmeric is added (geum means gold).

Cultivation

Its preferred habitats are well-ventilated, slightly moist soils in full sun. Propagation is made by tubers. Turmeric is relatively intolerant to cold. Therefore, it is suitable to plant the tubers in April 15 to 30 in the southern regions, and in late April to early May when in central regions, when the ginger is planted. To facilitate germination, develop the nib of tubers to a uniform size in the greenhouse or room and then transplant it into the field.

Repeated cultivation is possible but if repeatedly farmed in one spot, its me-

dicinal quality and the yield may deteriorate. Limestone should be added to the cultivation field once a year or in two years to turn the acidified soil alkaline. When the leaves and stems over the ground wither in autumn, collect the tubers.

Medical Uses

Turmeric is an ingredient of curry. It has been used as food in India for a long time. Its other uses include yellow dye, food coloring agents, and medicines. According to "Donguibogam (Eastern Medical Manual)," "it has cold properties and a pungent bitter taste with no toxicity. It treats clotted blood, sinks down energy, cures bloody urine, and heals wounds by metal and chest pains caused by blood energy." It is also used to facilitate secretion of bile and in the treatment of cholecystenteric stone. Slice the raw turmeric into the thin pieces and boil them to take as drinking water. Or drink its juice extract or make tea. Mix it with sugar or honey and age it for more than 3 months to get enzymes, or leave in spirit to make turmeric liquor.

Curcumin, the major ingredient of the turmeric is a yellow spice with polyphenol component and it is known to have excellent anti-tumor, anti-oxidation, and anti-inflammatory effects. It is reported that curcumin has anti-cancer effects on various cancers including the prostate cancer and prevents dementia by dissolving toxic components accumulating in the brain.

In addition, turmeric shows excellent sterilization and anti-insect effects. It constrains helicobacter pylori, the cause of food poisoning (such as salmonella, vibrio and listeria) and gastro-duodenal ulcer. Turmeric dyed materials repel insects. A case was reported where a house with turmeric planted around it in Okinawa had reduced termite damages.

In organic agriculture, such sterilization and anti-insect effects of the turmeric can be used for a natural pesticide. Extract juice from the plant, decoct or infuse it for use.

Juniper

When juniper is burnt, it produces a heavy scent. Junipers had been used for incense in ceremonies including ancestral rites. With its unique aroma, sterilization and anti-insect effects, junipers are used for materials to make pencils, ornaments, sculptures, and tools.

Juniper (Juniperus chinensis L) is an evergreen tall tree in the family Cupressaceae, growing up to 20 m (70 ft). Junipers were found in remote mountains, especially in Ulleung Island, but most of them disappeared and now, only Junipers planted by people for ornamental purposes are left. Juniper produces good scent and the bark is thinly peeled vertically. The young branches have needle-shaped leaves. Branches older than 7 or 8 years have scale leaves, along with the needle leaves. The needle leaves are arranged spirally or in opposite

pairs, mostly on the lower branches.

Juniper is dioecious. The yellow elliptical male flowers are borne at the tip of the last year's branches, and the roundish female flowers, 1.5 mm (0.6 in) long, are arranged at the end of the branches or on the leaf axil. The fruit is a cone, rounded, and ripens from green to black in September to October. About 3 seeds are found in one fruit. The dark brown seed is ovoid.

Cultivation

Its preferred habitats are sandy loamy soils in sunny spot. Propagation is made by cutting. Early March to April is suitable for cutting and the earlier the cutting period is, the better the root is seated. Collect 10 to 20 young branches from 10-year-old Temple Junipers and prick them to the cutting bead and shade sun by straws.

Apply rooting stimulants for better rooting. It takes 2 to 3 months until rooting. Move the seedling in the spring of the third year to the main field.

What should be kept in mind is that if fruit trees in the family Rosaceae, such as pear trees, quince trees or apple trees, are planted near junipers, the fruit trees and the Temple Junipers may suffer from the rust easily.

Medical Uses

The juniper heartwood generates pleasant scent. When the heartwood is burnt, heavier scent is generated. Therefore, the juniper heartwood has been used as incense in ceremonies including ancestral rites. With its unique aroma and sterilization and anti-insect effects, junipers are used to make pencils, ornaments, sculptures and tools.

The leaves contain flavonoid components including amentoflavone, hinokiflavone and apigenin, and the roots and the branches contain essential oil components (cedrol and pinene) and resin.

According to "CD-ROM Korean Herb" by Deok-kyun An, junipers are described as: "It has a spicy taste and warm properties with toxicity. It elimi-

nates wind and scatters cold energy, facilitates blood circulation, reduces swelling, neutralizes poison, and increases urination. It reduces fever of cold caused by wind-chill, treats inability to bend body, and pains caused by articular rheumatism. It has strong inhibiting effect on skin scabies and deters growth of scabies."

According to "Constituents and Medical Uses of Herbs," "1.8% of essential oil and lignin are contained in the xylem. The major ingredients of essential oil cedrol include cedrene and terpene with molecular formula of C20H32. The lignin component includes C20H18O6 and C20H2802. In the treatment of oriental medicine, the juniper is used for wounds and various skin diseases with their poison neutralization and sterilization effects. It is also used in the treatment of vomitting diarrhea and abdominal pains."

In organic agriculture, the aromatic essential oil components of junipers, with its sterilization and anti-insect effects, can be used as a natural pesticide. Extract juice from the plant or make a decoction or infusion. Or burn the juniper in sealed space to use the smoke.

Dalmatian chrysanthemum

The pyrethrin contained in Dalmatian chrysanthemum will kill cold-blooded animals, especially insects, by paralyzing their nervous system. It also harms fish. However, it is known to be harmless to warm-blooded animals like human or livestock.

Dalmatian chrysanthemum grows to 45-60 cm (18-24 in) tall. Roots are straight and reach down deep. Stem is also straight and erect. Leaves are dark green. Lower leaves look like feathers much like cosmos, upper leaves are smaller. Flowers bloom in May to June in white at the end of branches and stem. Its diameter is about 3 cm (1.2 in). On the outside are 15 to 20 white ray flowers while on the inside yellow smaller tubular flowers bloom densely. Fruits are achene with five veins.

JOHN LOGAN. www.wikipedia.org

Persian chrysanthemum (Chrysanthemum coccineum, Tanacetum coccineum) is a native of Caucasus region; its leaves resemble bracken and flowers are usually red.

Cultivation

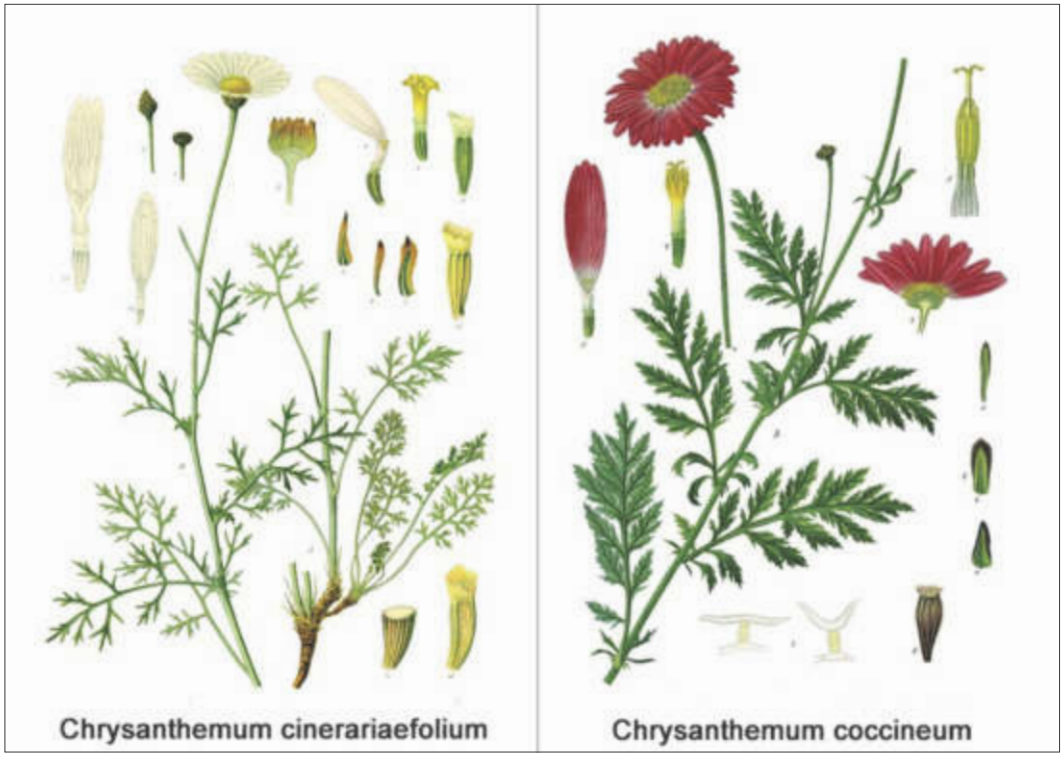
It likes full sun, slope, gravels and lime soil. Those grown in moist or fertile soil or under shade lack pyrethrin. Propagation is done by seeds or dividing of the plant. Get seeds or seedlings to begin with.

For seeds, directly broadcast in August or sprout them in a greenhouse to transplant next spring. For direct sowing, plant the seed in 1 cm (0.4 in) depth and cover with straw. Optimum germination temperature is 20 to 22 degrees Celsius (68-72 degrees Fahrenheit). It takes about 2 to 4 weeks for seeds to germinate. For dividing of the plant, when the plant sprouts in autumn or spring, cut and divide the round root and plant. Harvest the flowers in full bloom in a dry period.

Medical Uses

Insecticidal substances in Dalmatian chrysanthemum are pyrethrin I, II and cinerin I, II. They are concentrated mainly in the flowers and are in highest content when flower is at its peak bloom. Pyrethrin is yellow oil-like substance that does not dissolve in water but dissolves well in organic solvents like ether, benzene, and alcohol.

The pyrethrin contained in Dalmatian chrysanthemum will kill cold-blooded animals, especially insects, by paralyzing their nervous system. It also harms fish. It acts instantly but if the dose is not lethal, the animal will be paralyzed only momentarily to wake up again. However, it is known to be harmless to warm-blooded animals like human or livestock. It also does not damage plants.



Chrysanthemum cinerariaefolium

Chrysanthemum coccineum

KENPEI. www.wikipedia.org

"Constituents and Medical Uses of Herbs" explains of Dalmatian chrysanthemum as "it is an insecticide that can kill bedbugs, cockroaches, lice, mosquitoes, and agricultural pests. You can make mosquito coil by kneading powdered flower or leaves or stems with elm-tree bark powder with a little water; press it out into noodle-like shape and dry. Light it on fire to kill mosquitoes. To make insecticide, infuse the flowers in ether and use; or mix flower powder with talcum powder (8:2) and sprinkle on dry areas."

Natural pyrethrin and cinerin extracted from Dalmatian chrysanthemum are easily broken down in contact with oxygen, water or alkaline substances; losing its insecticidal property. To remedy this shortcoming, synthetic materials of pyrethrin family have been developed such as permethrin, cypermethrin, allethrin, resmethrin, etc. However, these synthetic substances are not allowed in organic farming.

To preserve your Dalmatian chrysanthemum's insecticidal effect for a long period, dry it well, seal air-tight, and store in a cool and dark place. Sprinkle the powder or infuse in water or alcohol. In greenhouses, you can mix with sawdust and fumigate by burning. When using outdoors, apply in a cool day with no sun in the late afternoon.

Crowfoot/Canton Buttercup

If you mash the whole plant and rub it on skin, it causes inflammations and blisters. They are caused by anemonin and protoanemonin, ingredients commonly found in plants that belong to the family Ranunculaceae, such as the Korean Pasque flower and the celery-leaved buttercup.

Crowfoot (Ranunculus chinensis) is a biennial plant, mainly growing in damp soil in enough sun or around wetlands. It grows to 40 to 80 cm (16-31 in) tall and the branches are divided into many sections. The stem and both sides of the leaf are densely covered in tough hairs. The leaf is tri-foliate and has a long petiole. Each leaflet is again 2 to 3-lobed deeply. In June, the yellow flowers are borne at the end of the stem or the branch in centrifugal inflorescence. The elliptical fruit is an achene and has bumps on the surface.

Longbeak Buttercup (Ranunculus tachiroei) is also a biennial plant, mainly growing in moist and sunny places. It grows to 50 to 100 cm (20-40 in) tall. The lower area

is covered in hairs. The higher the plant grows, the less hair there is and the shorter the petiole becomes. The leaves are two tri-foliates and 2 to 3-lobed deeply. In June to July, the yellow flowers are borne and the rounded fruit is an achene.

Canton Buttercup (Ranunculus cantoniensis) is a perennial plant growing to 30 to 80 cm (12-31 in) tall and densely covered in hairs. The leaves are one tri-foliate. In June to July, the yellow flowers are borne and the fruits are rounded like those of the longbeak buttercup.

Cultivation

In most cases, it grows wildly in damp soils in enough sun. As a poisonous plant, the crowfoot has very little value as an ornamental plant and is hardly ever cultivated. Crowfoot or longbeak buttercup is a biennial plant. If you really want to cultivate the plant, collect the matured seeds in summer and sow them immediately and avoid dry soil.

Medical Uses

It is a poisonous plant. In oriental medicine, the crowfoot, called Haehae-san and the canton buttercup, called Jagucho, are used for medicinal purposes. Collect the plant in summer and use the raw plant or dry it up in sun for use. It has a pungent taste and warm properties without toxicity. Apply the pounded whole plant to the affected area or rinse the area with the plant infusion. Take 3 to 9 g a day as a decoction.

According to "Grand Dictionary of Chinese Medicines," "It reduces inflammation and swelling, stops malaria and exterminates parasites. It is used in the treatment of hepatitis, ascites by liver cirrhosis, malaria and leprosy psoriasis (also called tinea cruris, a skin disease that causes itchiness and thickening of skin)."

If you mash the whole plant and rub it on skin, it causes inflammations and blisters. They are caused by anemonin and protoanemonin, ingredients commonly found in plants that belong to the family Ranunculaceae, such as the

Korean Pasque flower and the celery-leaved buttercup. A small amount of protoanemonin stimulates the central nervous system and improves functions of the reticulo-endothelium system. But its toxic components cause skin inflammation and kill cells. In addition to the above effects, the whole plant has antibacterial effects on staphylococcus, gram positive bacillus, negative bacillus, and candida fungus; anti-insect effects on malaria or amoeba protozoa.

In organic agriculture, the whole plant including the stems and leaves of the crowfoot or canton buttercup or longbeak buttercup can be used as a natural pesticide. Extract juice from the whole plant or decoct it with water or infuse it in alcohol for use.

Great St. John's Wort/St. John's Wort

Great St. John's Wort, called "Daeryeongyo," has a slightly bitter taste and cold properties. It tranquilizes the liver energy, stops bleeding, neutralizes poison, and reduces swelling and furuncles. St. John's Wort, called "Soryeongyo," has a pungent bitter taste and tranquil properties. It stops bleeding, reduces furuncles, and relieves pain.

Great St. John's Wort (Hypericum ascyron L) is a perennial plant growing at the mountain foot or the riverside in full sun in all parts of Korea. It grows to 50 to 80 cm (20-31 in) tall. The stem is slightly square-shaped and erect. The leaves, arranged in opposite pairs, are lanceolate, and the bottom of the leaves surround the stem. The leaves have smooth margin and are covered in a lot of transparent spots. The flowers are borne in July to August. The pinwheel-shaped flowers are reddish yellow and one flower is produced facing upward at the end of the branch respectively. There are a lot of stamens and one pistil. The tip of the pistil is 5-lobed deeply. The seed has a small netted vena-

tion.

St. John's Wort (H. erectum Thunb.) in the same genus hypericum grows to 20 to 60 cm (8-24 in) tall and the stem is rounded, erect and divided into sections. The leaves are lanceolate or long-ovate and in opposite pairs. The bottom of the leaves surrounds the main stem. The leaves have the smooth margin and are covered in scattered black spots. In July to August, yellow flowers are borne at the end of the branch in cluster. The ovate fruits ripen in October and contain a lot of seeds inside.

Cultivation

Its preferred habitats are moist and fertile soil in full sun. Propagation can be made by seeding, dividing suckers or cutting. Collect the matured seeds in September to October and sow them immediately or in early spring of the following year. Minute seeds are contained in the fruits and germination is relatively easy.

For dividing suckers, late autumn or early spring is the best time. In case of potting, place the plant in full sun and avoid dryness of soil.

Medical Uses

The fresh sprout is edible as a vegetable dish. In oriental medicine,

the whole plant excluding the root is dried up in July to August and used as medicines.

Great St. John's Wort, called "Daeryeongyo" or "Honghanryeon," has a slightly bitter taste and cold properties. It tranquilizes the liver energy, stops bleeding, neutralizes poison and reduces swelling and furuncles. St. John's Wort, called "Soryeongyo," has a pungent bitter taste and tranquil properties. It stops bleeding, reduces furuncles, and relieves pains. It is used in the treatment of hematemesis, nose bleeding, melena, menstrual irregularity, traumatic hemorrhage, contusion, and furuncles. In folk remedy, the dried leaves are also used as an anthelmintic. The major ingredient is hypericin, a pigment substance.

According to "Constituents and Medical Uses of Herbs," the whole plant of Great St. John's Wort contains hypericin, essential oil, tannins (5 to 10%), carotin and a small amount of choline and alkaloid. It also contains flavonoids including hiperosid, rutin, quercitrin, quercetin, isoquercitrin, coumarin, and saponin. Hypericin and tannin are also contained in the whole plant of St. John's Wort.

Hypericin is a red fluorescent substance, which is scattered in the leaves and

the flowers in transparent color for Great St. John's Wort and in black dots for St. John's Wort. With its antibacterial effects, hypericin is effective for treating various inflammations, strengthening contraction of the heart and contracting of the blood vessel. It also has phototoxicity. When exposed to sunlight, hypericin is activated in the body and releases toxic components.

In Europe, Common St. John's Wort (Hypericum perforatum L.) containing hypericin, hyperforin, flavin, and tannin has long been used as an anti-depressant and as herbal tea for insomnia and stress. Its oil extract was used as anti-inflammatory and antimicrobial agents for external application.

In organic agriculture, antibacterial and anthelmintic effects of Great St. John's Wort and St. John's Wort can be used as a natural pesticide. Extract juice from the whole plant when the flowers bloom or the fruits are borne, infuse or decoct it for use.

Derris

The pounded roots, stems, and leaves of the derris were added to streams or ponds to catch fish. They were also applied to the tips of arrows. Derris's root contains rotenone, an insecticidal substance. Its toxicity is low for mammals such as humans or livestock.

WIBOWO DJATMIKO. www.wikipedia.org

Derris is a climbing plant in the family Leguminosae, mostly found in Southeast Asia, including Indonesia, Malaysia, Bangladesh, Myanmar, Philippines, Thailand, and India. It usually grows at lowlands such as riversides, river banks or mountain ridges. Different varieties include Derris elliptical, Derris malaccensis and Derris uliginosa.

Derris is a high-climber reaching up to 16 m (52 ft). The root is red brown. The young branches are covered in tough hairs and they trail several meters even without leaves. The leaves are compound consisting of 7 to 15 leaflets. The leaflets are thin obovate and the young leaves are densely covered in tough hairs on both sides.

The inflorescences are borne on

the leaf axil or aged branch in cluster. The flowers are pink or white and covered in soft hairs. The flowers are produced one and a half year after planting. The fruits are pod-shaped and long-elliptical. Derris mostly produces flowers and bears fruits in wild environment but the fruits are hardly ever borne in cultivation. It usually takes about 4 months from pollination to fruitage.

Cultivation

Cultivation is made to obtain rotenone, an anti-insect component, from the root. Harvesting is available in one and a half to two years after raising seedlings. The rotenone content is found in the highest concentration when Derris elliptical is 26 month old. It grows well in various kinds of soil but it especially prefers fertile clay soils. Propagation is made by seeding or cutting.

The branch for cutting should be 5 mm (0.2 in) in diameter, 25 cm (10 in) long, have 1 to 3 nodes and 1 leaf. 8 to 10 cuttings can be obtained from one-year-old derris. The root is seated in 25 days. Avoid dryness in soils. The young cotyledon or the cutting branch may suffer from fungus diseases but the damage by pest insects hardly ever happens.

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Medical Uses

The pounded roots, stems, and leaves of the derris were added to streams or ponds to catch fish or they were used to poison arrow tips. It is called "Toeba" or "Tuba." For medicinal purposes, it is used as preservative, in the treatment of furuncles, leprosy or itchiness, or for abortion.

The root of derris contains rotenone, an anti-insect component. The pesticide made from the derris root is generally called Rotenone. Rotenone is a non-selective pesticide and is used for exterminating insects in home gardening, parasites or mites in pet dogs, and fish in water management.

The derris medicines kill parasites by penetrating into the digestive system, stigma, and body surface of insects. The efficacy of the medicines appears gradually. It toxicity is low for mammals such as humans or livestock and it inflicts no damage to crops. However, it is highly toxic for fish and shellfishes.

Rotenone is rapidly decomposed in soil or water. The half-life is 1 to 3 days and the activated component is known to be decomposed in 5 to 6 days in spring when it is exposed to sunlight and 2 to 3 days in summer. It is effective for exterminating mites, common cabbage butterflies, multerry thrips, leaf beetles and grain weevils in vegetables, and aphids, shield bugs, mite, tree lice in fruits.

In the organic agriculture, the root and the whole plant of the derris is used for a natural pesticide. Extract juice from the root and the whole plant or infuse or decoct them in organic solvents such as acetone and chloroform for use. Anti-insect effects decrease as time goes by once the medicine is made. Use it as soon as possible after preparation.

Tree of Heaven

In oriental medicine, the rhizodermis or bark of the tree of heaven is called “Jeogeunbakpi” and is used in the treatment of shigellosis, hemorrhoid, and bleeding caused by hemorrhoid. In folk remedy, the leaf and root decoction is used to treat skin diseases.

Tree of Heaven (Ailanthus altissima) is a tall tree in the family Simaroubaceae growing to 10 to 20 m (33-66 ft) in height. Native to China, the tree of heaven is cultivated everywhere in Korea and many of them are wildly grown along the roadsides or around rivers by propagation of seeds. “Gajuknamu” in Korean means fake (ga) Jook tree (Jooknamu). Unlike the edible Jook

tree (chinaberry tree) which looks similar, the tree of heaven is not edible because of nasty smell: hence the name "fake." The tree of heaven grows rapidly.

The leaves are 45 to 80 cm (18-31 in) long, odd-pinnate compound and arranged alternately on the stem. 13 to 25 leaflets are ovate-lanceolate with acute tips. The leaflets' undersides are pale green and have no hairs. They have two or four teeth, each containing smelly glands at the tip. On the other hand, the chinaberry tree has regularly arranged coarse serrates on the leaf margins without glands.

The tree of heaven is dioecious. In June to July, the small pale green flowers appear in large panicles in cluster. The male flowers have 10 stamens and the pistil of the female flowers is made up of five free carpels. The fruit is a samara that is 3 to 4 cm (1.2-1.6 in) long, long-elliptical and contains one seed in the middle of a thin and propeller-shaped wing.

Cultivation

It is tolerant to dryness, cold, and pollution. It grows rapidly and tall. It is

dioecious and the male flowers do not smell good and may cause allergies. It grows well in full sun and does not have any preference in soils. Spot clothing wax cicada, one of the fruit tree pests, likes the tree of heaven. As this pest uses the tree of heaven as a host, do not cultivate them in your property but rather go out and collect from wild ones.

If you really want to make propagation, use root cutting or dividing suckers. For seeding, collect the matured seeds in autumn and store them in the open field and sow them in the next spring. Germination is easy. For root cutting, cut the root 10 to 15 cm (4-6 in) long and prick the piece. Rooting is relatively easy, too.

Medical Uses

In oriental medicine, the rhizodermis or bark of the tree of heaven is called "Jeogeunbakpi" and is used in the treatment of shigellosis, hemorrhoid, and bleeding caused by hemorrhoid. In folk remedy, the leaf and root decoction is used to treat skin diseases. Collect the rhizodermis in spring and autumn, peel the outer skin and dry it for use.

According to "Grand Dictionary of Chinese Medicines," the rhizodermis contains mersosin, tannin, and phlobaphene, and the bark contains ailanthone, amarolide, acetylamarolide, quassin, and neoquassin. The seeds contain oil (35%), as well as 2, 6-dimethoxy-p-benzoquinone, ailanthone, ailantholide, chaparrinone, and quassin, while the leaves contain isoquercitrin and vitamin C.

The root and the inner skin of the stem are bitter and astringent and have cold properties. They reduce fever, eliminate moist energy, stop diarrhea and bleeding, and kill parasites. It is used in the treatment of shigellosis (chronic diarrhea) caused by moist fever in the large intestine, long-lasting bleeding caused by hemorrhoid and bloody stool, leucorrhea caused by vaginal bleeding and moist fever and sore or itchy skin. It is also used to exterminate roundworms. Take 6 to 12 g a day as a decoction or a pill.

In organic agriculture, sterilization and anti-insect effects of the tree of heaven can be used for a natural pesticide. Decoct or infuse the roots, barks, leaves and stems for use.

Decumbent Bugle (Geumchangcho)

It is said that the pounded fresh decumbent bugle is effective for treating furuncles, boils, and wounds. It is effective for reducing fever, neutralizing poisons, loosening sputum, and stopping cough.

Decumbent Bugle (Ajuga decumbens Thunb.) is a perennial plant in the family Lamiaceae, commonly growing at roadside grasslands or fields and mountains in the southern regions. The root leaves spread in a radial shape. The upper leaves are wide elliptical and the lower leaves are gradually narrowed down and have the wave-shaped serrates on the margin. They are dark green but look purplish in general and the stems and leaves are covered in a lot of hairs.

The lipped flowers are borne on the leaf axil in cluster in April to May. The upper flowers are purple and semicircle-shaped and the lower flowers are divided into 3 sections. There are 4 stamens; two of them are long. The fruits are borne in May to June. The fruit is a meri-

carp consisting of 4 sections. It is ovate, globose, 2mm long and with the netted pattern. It is said that the pounded fresh decumbent bugle is effective for treating furuncles, boils and wounds.

Cultivation

Decumbent bugle does not have preferences in soil quality but it grows well in well-drained sandy loamy soils. It grows well in partial-shade and in full sun. Its natural habitats are mostly southern regions. It is recommended cultivating the plant in greenhouses or pots in the central regions where frost damages may occur. Propagation is made by dividing suckers or seeding. Divide suckers in autumn or collect the matured seeds in May to June and sow them immediately.

Medical Uses

In oriental medicine, the whole plant of the decumbent bugle, called "Bakmohagocho," is used as medicine. It has a bitter sweet taste and cold properties. It acts on the meridian system of the lung. It is effective for reducing fever, neu-

tralizing poisons, loosening sputum, stopping cough, and treating excessive fever in the blood.

According to "Chinese Medicinal Herbs," "the decumbent bugle is used for treating sore and painful throat, cough and pains caused by various lung diseases, eye pains, malignant furuncles, snake bites, and wounds caused by falling or bumping. For medicinal purposes, collect the whole plant in the flowering season. Take 30 to 60 g of the fresh plant. Take 10 to 30 g of the dried plant as a decoction or an infusion."

It has also a strong bacterial inhibition effect. In tests, it was revealed that the decumbent bugle considerably suppresses streptococcus, staphylococcus aureus, streptococcus pneumoniae, colon bacterium, and Pseudomonas aeruginosa. It also enhances anti-inflammation and immunity.

The whole plant of the decumbent bugle contains flavonoids glycosides, saponin, alkaloid, organic acid, tannin, phenolic compound, steroid, and re-

duced sugar. Its major ingredient is luteolin. Steroids include insect metamorphosis hormones, such as cyasterone, ecdysterone, and a trace amount of ajugasterone C, as well as their counterparts, ajugalactone components. Kiransin is contained in the root.

Steroid hormones contained in the decumbent bugle, including ecdysterone, cyasterone, ajugasterone, and ajugalactone, are the ingredients that affect metamorphosis and molting of insects. Those ingredients are chemical substances secreted by plants in order to protect themselves from insects. When insects consume a large amount of such steroid hormones, their growth and metamorphosis is disturbed and normal growth is prohibited. Asiatic self-heal and the bugle also contain those substances.

In organic agriculture, the decumbent bugle's antibacterial components and various metamorphosis hormones that wards off insects can be used as a natural pesticide. Extract juice from the plant, decoct it with water or infuse it in alcohol.

Knotgrass

In oriental medicine, the whole plant of the knotgrass, called "Pyeonchuk," is used as medicine. Collect the plant in June to July when the flowers bloom and dry it up in sun. It has a bitter taste and cold properties. It increases urination, reduces fever and exterminates parasites.

Knotgrass (Polygonum aviculare L.) is an annual plant in the family Polygonaceae, commonly growing at roadsides, field, ridges of the field, around the brook, sandy lands and meadows. It grows to 10 to 40 cm (4-16 in) tall and the branch splits in the lower area and trails sideward or stands obliquely. The entire plant is hairless but covered in white powder, making it look greenish white. The leaves are long elliptical or willow-shaped, and arranged alternately. There is a node on the petiole surrounded by the membranous stipule.

In June to July, the reddish white, very tiny flowers are borne on the upper area of the leaf axil in cluster. There is no petal and the green-based white or red calyx is di-

vided into 5 sections. There are 6 to 8 stamens and 3 pistils. The dark brown fruits ripen in September to October. They are ovate and have three edges, thin patterns and small spots. It is widely found in temperate regions of the northern hemisphere.

Cultivation

Cultivation is available in all parts of the country. The knotgrass prefers wet sandy loamy soils. Propagation is made by seeds. In March to April, scatter or drill the seeds for planting. Then, cover one layer of shallow soil and tramp the ground. When 4 to 7 main leaves appear, thin out the rows of the knotgrass to have the distance of 12 to 15 cm (4.8-6 in) between one row to another. Water the plant frequently in dry season to maintain soil moisture.

Medical Uses

The fresh sprout is edible. In oriental medicine, the whole plant of the

knotgrass, called “Pyeonchuk,” is used as medicine. Collect the plant in June to July when the flowers bloom and dry it up in sun. It has a bitter taste and cold properties. It increases urination, reduces fever and exterminates parasites.

In Europe, the knotgrass is used as diuretics and styptics, and in the treatment of kidney and urinary bladder stone, bleeding in the digestive tract, stomach ulcer, duodenal ulcer, and asthma. In China, knotgrass is used in the treatment of kidney stone, urinary bladder stone, children’s cholera, furuncles, hemorrhoids, and skin diseases. In Japan, it is used as an anthelmintic and in the treatment of jaundice and abdominal pains.

According to “Grand Dictionary of Chinese Medicines,” “the whole plant contains avicularin, quercitrin, d-catechol, gallic acid, caffeic acid, oxalic acid, salicic acid, chlorogenic acid, p-coumaric acid, mucilage, glucose, fructose, and saccharose. Silicic is distributed in the leaves (1.6%), stems (0.6%) and roots (0.4%).

When the knotgrass is used as pasture, its toxic components cause eczema and stomach disorder to horses and sheep. Doves are the most sensitive to the toxicity of the knotgrass. The minimum lethal dose of infusions (10 to 20%) or decoctions (1:40) for cats and rabbits is 20ml/kg."

According to "Constituents and Medical Uses of Herbs," "the knotgrass, accompanied with the Asian plantain seeds and three-leaf akebia stems, is used as diuretics and insect-repellants, in the treatment of gonorrhea, difficulties in urination, acute urethritis, and cystitis. It is used with Artemisia iwayomogi for jaundice and its decoction is used in the treatment of intestinal convulsions, abdominal pains, vaginal bleeding, and bloody flux. It is also used as an anthelmintic. Take 6 to 15 g by decocting the plant with water."

In organic agriculture, toxicity and anti-insect effects of the knotgrass can be used as a natural pesticide. Extract juice from the whole plant, decoct it with water or infuse it in alcohol for use.

Euphorbia Humifusa (Jigeumcho)

Euphorbia humifusa, E. supine and E. maculate are called "Jigeumcho" and used for medicinal purposes. "Jigeumcho" means silk-like (geum) plant (cho) on the ground (ji). It is effective for reducing fever, neutralizing poisons, facilitating blood circulation, stopping bleeding, eliminating moist energy, and promoting lactation.

Euphorbia humifusa (Euphorbia humifusa Willd.) is an annual plant that belongs to the genus Euphorbia in the family Euphorbiaceae, commonly growing in empty sites or roadsides of the field. The reddish stems grow trailing along the ground in all directions. The leaves are in opposite pairs and spread horizontally following the stems. The leaves are elliptical and have rounded tips.

But the lower area of the leaves is narrowed down on one end and has fine serrates in the margin. The petiole is very short and the linear stipule is usually 3-lobed deeply.

In August to September, several male flowers are produced along with one female flower in the center from the goblet-shaped, pale red involucre on the leaf axil. The male flower has one stamen, and the female flower has 3 styles divided into two sections. The ovate fruit is a capsule, has 3 ridges and is divided into 3 sections. Similar plants include E. maculate and E. Supine, native to North America. E. maculate has obliquely standing main stem. The stems and fruits of E. supine are covered in hairs and have red spots.

Cultivation

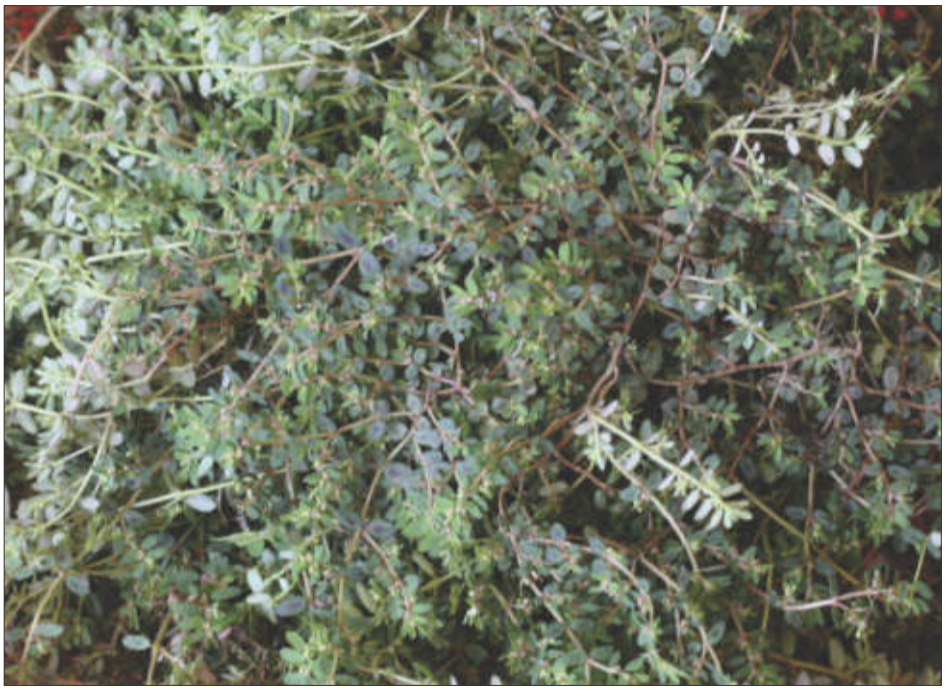
It is an annual plant that grows well in warm and humid climates. Its preferred habitats are well-drained sandy soils or sandy loamy soils. Propagation is done by seeds. In March to April, mix the seeds with sand or manure and sow them in a distance of 30 cm (12 in). When the seedlings grow relatively tall, remove weeds and give additional manure. It is suitable for single cultivation or can be planted between other agricultural crops such as corn.

Medical Uses

Euphorbia humifusa, E. supine and E. maculate are called "Jigeumcho" (silk on the ground) and used for medicinal purposes. Collect the plant in summer when the flowers bloom. Eliminate the root from the plant and dry it up in sun. White latex is produced when the leaves or stems are cut.

The whole plant contains flavonoids (including quercetin), gallic acid, myoinositol, and isomotiol components such as triterpenoids, and the leaves contain tannin (12.89%).

According to "Grand Dictionary of Chinese Medicines," "It has a bitter taste and tranquil properties. It is effective for reducing fever, neutralizing poisons, facilitating blood circulation, stopping bleeding, eliminating moist energy, and promoting lactation. It is also used in the treatment of bacillary dysentery (diarrhea), gastroenteritis, bloody cough, melena, atypical bleeding (a large amount of bleeding or continuous bleeding during non-menstrual period), traumatic hemorrhage, jaundice by moist fever, difficulties in breast milk pro-



duction, carbuncles and suppuration, calcaneodynia caused by contusion. Take 3 to 6 g as a decoction or powder. For external uses, apply the pounded plant to the affected area.

The juice extract, decoction or alcohol infusion of the plant has clear antibacterial effects on pathogenic coccus and bacillus. "Jigeumso," made by repeatedly extracting the plant in alcohol, has even stronger antibacterial power. 0.002 to 0.63mg/ml concentration shows antibacterial effects and 0.005 to 1.25mg/ml concentration shows sterilization effects for yellow staphylococcus aureus, green streptococcus, hemolytic streptococcus, streptococcus pneumoniae, colon bacterium, typhoid bacillus, and dysentery bacillus."

In organic agriculture, such antibacterial and sterilization effect of Euphorbia humifusa can be used as a natural pesticide. Extract juice from the plant, decoct it with water or infuse it in alcohol.

Rough Cocklebur (Changija)

Changija has a sweet taste and warm properties with toxicity. It acts on the lung, liver, and kidney meridians. It is effective for treating stroke, relieving pain, eliminating moist, and exterminating parasites.

Rough Cocklebur (Xanthium strumarium L.) is an annual plant in the family Asteracecae, growing in the field or roadside of all parts of the country. It grows to 1 to 1.5 m (3.3-5 ft) tall. The entire plant is covered in tough hairs and the stem is erect. The leaves are broad-triangular and 3 to 5-lobated with a coarsely serrated margin. Three clear veins are found undersides of the leaf and the petiole is long and alternately arranged.

The flowers are dioecious (the male flowers and the female flowers are produced separately) and borne in panicle at the end of the branch and the main stem in August to September. The male flowers, yellow and slightly rounded,

are arranged in the upper area and the ovate female flowers are produced in the lower area. The female flowers are surrounded by the involucre with hook-shaped thorns and have two pale purple pistils at the top. The outer surface of the fruits is covered in the hook-shaped thorns, making it easy to get attached to other objects; 2 seeds are found inside.

Cultivation

It is possible to cultivate the rough cocklebur in all parts of Korea. It is not picky on soil quality. As the rough cocklebur is an annual plant, propagation is made by seeds. Collect the matured seeds in October and store them and sow them in April of the next year. Before sowing, soak the seeds in water for half a day for better germination.

The appropriate furrow space is 100 cm (3.3 ft). Plant 2 to 3 seeds as a group to maintain the span length of 50 cm (20 in) and water them sufficiently. Germination is relatively easy and the new sprout appears in about 2 weeks after sowing. Initial weeding allows vigorous growth. Cultivation is easy as the plant is

very tolerant to diseases and pests.

Medical Uses

The leaves, roots and fruits are mostly used. The leaf is called "Changi" and the root is called "Changigen" and the fruit with the hook-shaped thorns is called "Changija." They are all used for medicinal purposes.

According to "Grand Dictionary of Chinese Medicines," "Changi has a bitter pungent taste and cold properties with a little bit of toxicity. It is effective for eliminating bad wind energy, releasing heat, neutralizing poisons, and exterminating parasites. It is used in the treatment of chronic headaches, dizziness, convulsions of hands and feet caused by moisture, red eyes, corneal opacity, leprosy, boils, skin rash caused by internal fever and itchy skin.

Changija has a sweet taste and warm properties with toxicity. It acts on the lung, liver, and kidney meridians. It is effective for treating stroke, relieving pain, eliminating moist, and exterminating parasites. It is used in the treatment of headaches caused by cold, chronic rhinitis (sinus infection), toothaches, and paralysis by wind, cold and moisture, convulsion of hands and feet and pains, scabies and itchiness.

Take 5 to 10 g as a decoction, pill or powder. For external use, apply the

pounded plant to the affected area or burn the plant to the point that it still has the nature of medicine and apply the powder generated from burning or rinse the affected area with the decoction. The rough cocklebur should not be taken for headaches or paralysis pains caused by anemia."

According to "Constituents and Medical Uses of Herbs," the whole plant of the rough cocklebur contains xanthinin, carotinoid, alkaloid, and saponin. The fruits contain xanthostrumarin (yellow glycoside), resin, and iodides. The seeds contain resin, up to 40% of oil (63.4% of linolic acid, 27% of oleic acid, and 8.2% of saturated fatty acid).

The entire body of the rough cocklebur has toxicity. Fresh or young leaves are more toxic than dried or aged leaves. Fruits have the highest toxicity among all plant body parts. When livestock, especially pigs, eat the young sprout, they are poisoned. When humans ingest fresh, roasted or decocted rough cocklebur excessively, poisoning symptoms may occur, depending on the physical constitution.

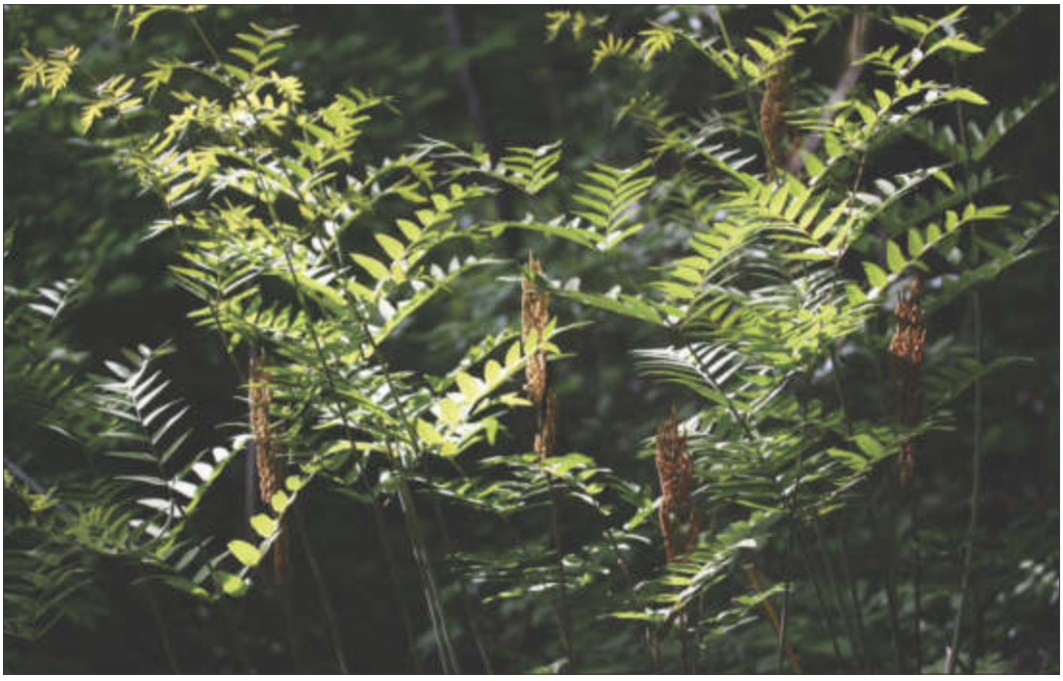
The poisoning symptoms start from dizziness, headaches, loss of appetite, vomiting, abdominal pains, and diarrhea in general. In more serious cases, they develop to disorder in the central nervous system, liver and kidney failure, clouding of consciousness, paralysis, excessive decline in heartbeat, jaundice, dyshepatia and bleeding. When the poisoning symptoms are very serious or emergency treatment is not made in time, unconsciousness caused by mass-necrosis of liver cells and weakness of kidney and respiration may lead to death.

In organic agriculture, such toxicity of the rough cocklebur can be used as a natural pesticide. Extract juice from the whole plant, decoct the whole plant or the fruit or infuse it in alcohol for use.

Japanese Royal Fern

Fresh sprout is edible as a vegetable dish or can be used as a soup ingredient. It is effective for killing parasites, reducing fever, neutralizing poisons, eliminating extravasated blood, and stopping bleeding. It is also effective for exterminating roundworms, tapeworms, and pinworms, reducing fever, neutralizing poisons, cooling blood, and stopping bleeding.

Japanese Royal Fern (Osmunda japonica Thunb.) is a perennial plant that belongs to the genus Osmunda in the family Osmundaceae. It is a pteridophyte, growing in wet and relatively shady areas of the mountains. It is found in Korea, China, Japan, Taiwan, Sakhalin, Philippines, and India. It grows to 60 to 100 cm (24-40 in) tall and the subterranean stems are short and thick, lump-



shaped, and have several leaves in cluster. The leaves are divided into trophophylls and sporophyls. The petiole is glossy and covered in red brown hairs in the young phase. The hairs disappear gradually.

The trophophylls are pinnate with two leaflets; the bottom leaflet is the largest. The leaflets are 5 to 10 cm (2-4 in) long, lanceolate and with blunt tips. They have blunt-serrated margin and no petiole. When the leaves are matured, the hairs disappear and become glossy. In spring, the gametophylls are produced earlier than the trophophylls. The gametophylls are erect and 20 to 30 cm (8-12 in) long. The small leaf lobes are linear, dark brown and densely covered in sporangia. The spore is ripe in September to October.

Cultivation

Its preferred habitats are cool and slightly shady areas. It especially prefers high humidity in the air for good growth. Propagation is made by rootstocks or spores. For propagation by rootstocks, dig out the wild-grown rootstocks in the mid-November or in March and plant them by spreading without cutting off the

fibrous roots. Make a ridge 80 cm (31 in) wide on the furrow and plant the rootstocks while maintaining the distance of 30 cm (12 in) between the heads.

For propagation by spores, the immature spores are germinated faster and easily than the matured spores. On peat moss culture media, shade 70% of sun light and maintain 23±3 °C (73.4±5.4°F) with 95% moisture. About 1 month later, the prothallium is germinated and 6 months later, the sporophyte is formed. Permanent planting should be made in mid-November or in March of the following year for better growth and rooting rate. After permanent planting, shade 50% of sun light to avoid dryness and water the plant.

Medical Uses

The fresh sprout is edible as a vegetable dish or used as a soup ingredient. In oriental medicine, the rootstocks are called "Jagui" or "Jaguigwanjoong" and they are used for medicinal purposes. In addition to the Japanese royal fern, the rootstocks of the closely related plants, including Osmunda asiatica, wood fern, Athyrium brevifrons, Athyrium pycnosorum, Matteuccia struthiopteris, and Woodwardia japonica, are also called "Gwanjoong" (wood fern) and used for medicinal purposes. Dig out the root in spring and autumn and remove the petiole and the fibrous roots. Dust out dirt, rinse the plant thoroughly and dry it up in sun.

According to "Grand Dictionary of Chinese Medicines," Japanese royal fern has a bitter taste and cold properties with a little bit of toxicity. It is effective for killing parasites, reducing fever, neutralizing poisons, eliminating extravasated

blood, and stopping bleeding. It also kills roundworms, tapeworms, and pinworms. It is used to reduce fever, neutralize poisons, cool blood, and stop bleeding. It is used in the treatment of cold caused by wind fever and small rashes caused by warm fever. It is also effective for treating hematemesis, red-eyes, bloody stool caused by internal hemorrhoid, bloody flux, and leucorrhea.

Take 5.5 to 11.1 g as a decoction, pill or powder. For external uses, apply the powdered Japanese royal fern mixed with water into the affected area. The Japanese royal fern is not suitable for those who have insufficient body fluid and internal fever and those who have weak spleen and stomach. Pregnant women should take caution.

The Japanese royal fern contains osmundalactone, osmundalin, dihydroisoomundalin, and parasorboside, as well as molting hormones such as ponasterone A, ecdysone, and ecdysterone.

The wood fern of the Japanese royal fern has anthelmintic effects on roundworm, tapeworms, and pinworms, as well as anti-virus and antibacterial effects. The molting hormones contained in the plant disturb growth and metamorphosis of insects when the insects consume a large quantity, thereby preventing normal growth. In organic agriculture, such property of the Japanese royal fern can be used in making natural pesticide. Extract juice from the plant, decoct it with water or infuse it in alcohol for use.

Chinese Pepper Tree

The immature fruits are edible as a vegetable dish pickled in soy sauce. Traditionally people used matured seeds to extract oil and improve stomach functions, for anti-inflammation and increase in appetite, and in the treatment of stomach disorder and asthma.

Chinese pepper tree (Zanthoxylum schinifolium) is a deciduous broad leaf shrub, found in the mountains of the central-to-southern regions of Korea. It grows to 3 m (10 ft). The bark is gray brown and the thorns are arranged alternately. The leaves are alternate, pinnate and consist of 13 to 21 leaflets. The leaflets are long-elliptical or pinnate, and have fine serrates on the margin and clear oil spots underside, where a unique herbal scent is generated.

The flowers are dioecious. In August to September, the pale yellow flowers

are arranged at the end of the branch in corymb. The small peduncles have nodes. Five petals are curled inward. The male flowers have 5 stamens rising above the petals and the pistil of the female flowers splits into three sections. The fruit is a capsule and turns from green brown to brown at maturity in October. The fruit skin splits into 3 sections, exposing the black seeds inside.

Unlike the Chinese pepper tree with alternately arranged thorns, the Japanese pepper tree has thorns arranged in opposite pairs. The Japanese pepper tree without the thorns is called "Minsancho" (var. inermis), and the Japanese pepper tree with the small and narrowed leaves is called "Jomsancho" (var. microphyllum).

Cultivation

The Chinese pepper tree is cold-hardy, and therefore, can be cultivated in all parts of the country, even in infertile soil. However, as the root is shallowly seated, it is recommended to cultivate the Chinese pepper tree in well-drained

soil. The fruits can be harvested in 1 to 3 years after planting. Propagation is made by seeding, cutting or grafting.

For seeding, collect good-quality seeds in October and rinse them with a rinsing agent. Mix them with wet sand, put them in a sack and bury the sack in the ground. Sow the seeds in early spring of the following year. It is hard to tell its sex in case of seedlings grown out of the seeds. If the male trees are produced excessively, you can cut them down or draft the branch of the good-quality female trees.

Cutting or grafting is recommended to increase production and obtain high quality fruits. Uprooting is relatively easy for cutting collected from the branch generated from the adventitious bud. Chinese pepper tree produces flowers and bears fruits from the branch of the current year. If you form a lot of new branches by trimming or pruning in the following year, you can increase production.

Medical Uses

The immature fruits are edible as a vegetable dish pickled in soy sauce. Traditionally people used matured seeds to extract oil and improve stomach functions, for anti-inflammation and increase in appetite, and in the treatment of stomach disorder and asthma. In oriental medicine, the fruit skin is called “Yacho” or “Hwangchoja” and used for medicinal purposes.

According to “Illustrated Book of Chinese Medicinal Herb,” Yacho is described as following: “It has a pungent taste and

warm properties. It is effective for warming up the middle body to eliminate wind-chill, drying up eczema, exterminating insects, and stopping pain by facilitating energy circulation. It removes feeling of coldness from abdomen, stops vomiting and diarrhea, and treats roundworms, oriental liver flukes, toothaches, seborrheic dermatitis. Take 4 to 8g as a decoction or for external uses."

According to "Constituents and Medical Uses of Herbs," "The Chinese pepper tree fruits contain oil (26 to 39%) and essential oil (0.7 to 1%). 90% of the essential oil is estragole. In addition to estragole, methyl cavicol, anise aldehyde and P-methoxy-cinnamic acid aldehyde are also contained. The fruit skin also contains benzoic acid and, 0.3% of bergapten. The similar essential oil components as those of the fruits are found in the leaves."

The more mature the fruit, the more strong-scented estragole component there are. It is recommended using the immature fruits for tea or cooking, and the matured seeds for sterilization.

In organic agriculture, Chinese pepper tree can be used for a natural pesticide. Decoct or infuse the pruned branch or fruit for use.

Horsetail

The young reproductive stems of the horsetail, called "Baembap," are used for a vegetable dish boiled down in seasonings, a fried vegetable or a vegetable pickle in soy sauce. Dried vegetative stem is used for tea. In oriental medicine, the vegetative stems are called "Moonhyeong" and used for urination, hemostasis, decrease in blood pressure, and anti-inflammation.

Horsetail (Equisetum arvense L.) is a perennial pteridophyte in the family Equisetaceae, commonly growing at the sunny meadows or by the brooks in all parts of the country. In early spring, the reproductive stems, called "Baembap," are produced first. The reproductive stems do not have branches and the leaves are spirally arranged around the nodes and bigger than those of the vegetative stems. The leaves are attached together to become the bark. The entire plant is dark brown, glossy and has tower-shaped sporangia spike at the top which dis-

charges the spores and withers.

The vegetative stems grow when the reproductive stems are about to fall. The vegetative stems are erect, 30 to 40 cm (12-16 in) tall and has long-stretching subterranean stems for propagation. The vegetative stems are green and have the nodes and the ridges; the scale leaves are spirally arranged on the nodes and the branches split. Cows like to graze this grass; hence the name "Soeteugui" in Korean.

Cultivation

Its preferred habitats are relatively wet soils with enough sun. As the horsetail has strong reproductive power, it is recommended using reclaimed land or establishing a blocked section to prevent the horsetail from spreading toward the crop land. Propagation is made by dividing suckers or spores.

Dividing suckers is available anytime but the rainy season is the best. Cut the roots with the terrestrial stems attached and plant those in the distance of 20 cm (8 in). For propagation by the spores, cut the stems in May right before the sporangia swells and the spores fly away, collect the seeds and sow them immediately. Cover the seeds in shallow soils.

Medical Uses

The young reproductive stems of the horsetail, called "Baembap," are used for a vegetable dish boiled down in seasonings, a fried vegetable or a vegetable pickle in soy sauce and the dried vegetative stem is used for a tea. In oriental medi-

cine, the vegetative stems are called "Moonhyeong" and used for urination, hemostasis, decrease in blood pressure, and anti-inflammation.

According to "Grand Dictionary of Chinese Medicines," "Cut the whole plant in May to July and dry it up in shade. It has a bitter taste and cool properties. It is effective for reducing fever, eliminating fever from the blood, stopping cough and increasing urination. It is also used in the treatment of hematemesis, nasal bleeding, bloody stool, vicarious menstruation, chronic cough, shortness of breath and gonorrhea.

The whole plant contains equisetonin, equisetrin, isoquercitrin, galuteolin, silicic (5.19 to 7.77% of the dried horsetail), organic acid, fat, β-sitosterol, palustrine, dimethylsulfone, thymine, 3-methosypyridine and various amino acids. The spore contains articulatin, triacontane-dicarboxylic acid, gossypitrin, herbacetrin and isoarticulatin."

According to research, silicic, the major ingredient of the horsetail, helps bone growth, heals wound and improves immunity. Equisetrin has toxic components. Horses grazing a large amount of horsetails suffer from stomach problems and pneumoconiosis.

According to "Constituents and Medical Uses of Herbs," the horsetail is described as following; "In animal tests, it was revealed that the whole plant has urination, hemostasis, and anti-inflammatory effects. Its urination effect is

stronger than diuretin. In addition, silicic is also effective in releasing lead in case of lead poisoning.

Horsetail, accompanied with the cardiac tonic, is used for chronic cardiac insufficiency. It is recommended using the horsetail, along with the icebery leaves for urethra diseases and cystitis. Horsetail is also used for prevention and treatment of chronic and acute lead poisoning. It is also used in the treatment of hemorrhoid and vaginal bleeding as a hemostatic. It is said that there is no significant side effects in the horsetail, but irritation on the kidney cannot be simply ignored. Take cautions when using the horsetail for acute nephritis and nephrotic nephritis.

In the treatment of oriental medicines, the whole plant is used as a diuretic or a hemostatic in the treatment of difficulties in urination, nasal bleeding, enterohemorrhage, hemoptysis, hemorrhoid bleeding, and profuse menstruation. Apply the powdered whole plant or the plant juice extracts to the bleeding area to stop bleeding and help heal the wound rapidly. You can take 10 g a day as a decoction."

It is said that in North Korea, the horsetail spore succus is used as a pesticide. It is known to be very effective for treating downy mildew, rust and frosty mildew of crops. When the spores are borne on the reproductive stems (Baembap), cut the head and dry it up in sun for 2 days. Collect the spores and boil them in water. Strain the spores and mix them with an emulsifier such as soap for spraying. The leaves also can be used as a pesticide although its efficacy is lower than the spores.

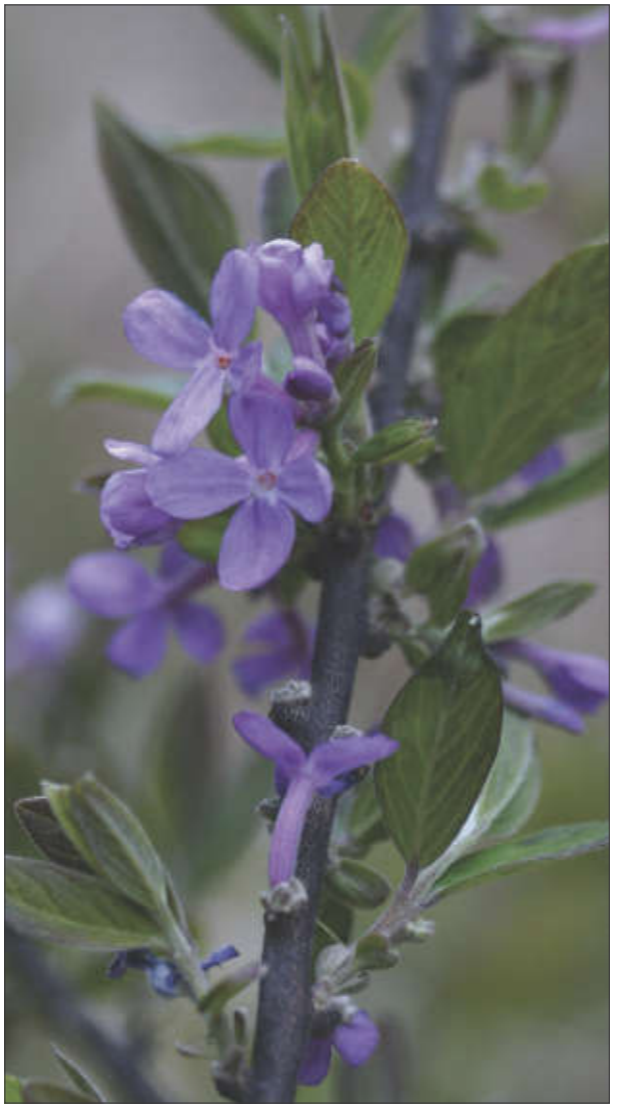
Lilac Daphne

The Lilac Daphne is a poisonous plant. The entire plant body contains toxic components; the roots and the flowers are especially more toxic. In oriental medicine, the flower, called "Wonhwa," is used for medicinal purposes. It is effective for improving urination and eliminating sputum.

Lilac Daphne (Daphne genkwa Siebold & Zucc.) is a deciduous shrub, growing to 1 m (3.3 ft) tall near the beach in Jeonla province and South Chungcheong province. It is found in Korea, Japan, and China. The branches are dark brown and covered in soft hairs. The leaves are elliptical or long-elliptical, and mostly arranged in opposite pairs but sometimes alternately. The leaves

have plain margin and the underside of the leaves is covered in soft hairs. The petiole is short and densely covered in hairs.

In March to May, pale purple flowers bloom profusely to even cover the branches. 3 to 7 flower buds are borne in cluster on the short flower stalk. The calyx is tubular and covered in fine hairs on the surface. The tip of the calyx splits into 4 sections, forming the petal shape. It is 10 to 12 mm in diameter. 4 to 8 stamens are arranged in two rows on the calyx tube. The rounded fruit is a drupe and ripens in July.



Cultivation

It grows well in temperate climates. As the Lilac Daphne is also cold-hardy, it can be cultivated in all parts of the country. Its preferred habitats are barren sandy loamy soils in enough sun. The Lilac Daphne grown in dry and infertile soils produces more colorful flowers and lives longer. Maintain dryness as the Lilac Daphne hates moisture. Propagation is made by seeding, root division or cutting.

For seeding, collect the seeds in June to July, and sow them immediately. Germination takes place in about one month. For root division,

dig out the root and cut it 10 cm (4 in) for planting. The coppice shoot is generated from the root and growing into the sprout. It is recommended performing the root division in June, instead of spring. If several sprouts come up, leave only one sound sprout and get rid of the rest of them for faster growing. Summer or spring is recommended for cutting but the rooting percentage is not very high.

Medical Uses

The Lilac Daphne is a poisonous plant. The entire plant body contains toxic components and the roots and the flowers are especially more toxic. The flowers contain genkwanin, hydroxygenkwanin, apigenin and sitosterol. Benzoic acid and astringent essential oil substances are also included in the flowers. In oriental medicine, the flower, called "Wonhwa," is used for medicinal pur-

poses. Collect the flowers in spring before the flower buds split open and dry them up in sun.

According to "Grand Dictionary of Chinese Medicines," "It has a pungent bitter taste and warm properties with toxicity. It acts on lung and spleen meridians. It is effective for improving urination and eliminating sputum. It is used in the treatment of moisture stagnation and internal lumps in the body, asthma and cough, edema, flank pain, food poisoning, furuncles, and boils."

Efficacy of Wonhwa is similar to that of Euphorbia pekinensis or Euphorbia sieboldiana. Wonhwa is highly effective for eliminating water and moisture stagnated in the upper body. In this regard, Wonhwa treats chest/flank pains or edema, and it is effective for treating dry cough and poor urination and bowel movement. The root, called Wonhawgeun, is also used in the treatment of edema, tuberculous cervical lymphadenitis, acute mastitis, scabies, and fistula.

Wonhwa is highly toxic. If it is not properly processed or if an excessive amount is taken, serious diarrhea and abdominal pain will result. Those who have weak energy or pregnant women should take extra cautions when using Wonhwa. Avoid using Wonhwa with licorice roots. If they are used together, the moist discharging effect of Wonhwa decreases but its toxicity increases.

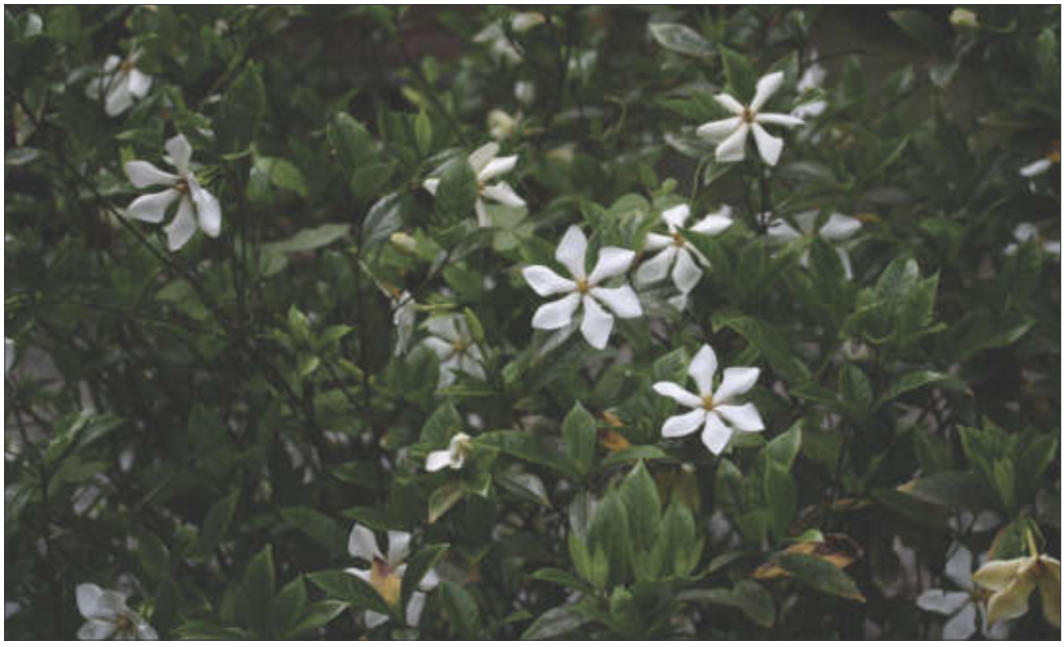
The Lilac Daphne also has anti-insect effects. It is effective for treating viral diseases and shows clear efficacy for exterminating root knot nematodea, mites, and entomopathogenic nematode. Decoct or infuse the whole plant, flowers or roots for use.

Common Gardenia

The orange fruits had long been used as a natural pigment to color food and fabric. In oriental medicine, the fruits, called “Chija” and the roots, called “Chijahwageun,” have been used for reducing fever, strengthening the gall bladder, stopping bleeding and anti-inflammation.

Common gardenia (Gardenia jasminoides Ellis) is an evergreen short tree in the family Rubiaceae, native to China growing to 2 to 3 m (7-10 ft) tall. It is assumed that the common gardenia was first introduced to Korea about 500 years ago. In the southern regions, it can be cultivated outdoor but in the central-to-northern regions, it can only be grown in greenhouse or indoor. A lot of ornamental gardening species of the common gardenia were developed.

The leaves are in opposite pairs or three leaves are spirally arranged. The



leaves are leathery, long elliptical and with plain margins. The petiole is short and has acute stipules. The flowers are dioecious; in June to July, the male and the female flower blooms at the end of the stalk respectively. The white flowers turn yellowish white as time goes by, generating a strong fragrance. The fruits are obovate and ripen orange in September. The fruits, 2 cm (0.8 in) long, have 6 to 7 ridges and the calyxes remained. They do not split open at maturity and the yellow flesh and seed are found inside.

Cultivation

Its preferred habitats are deep, fertile, sandy, and loamy soil. It is relatively intolerant to cold climates and grows fine in partial shade. But for better flowering and harvesting, it is recommended shedding enough sunlight on the plant. The common gardenia is relatively drought-tolerant, but the young plant may be susceptible to drought. Avoid dryness in spring and in autumn. If the plant is dry during the harvesting season, the fruits are not properly produced. Propagation is made by seeding or cutting.

For seeding, collect the seeds in autumn and sow them immediately. After sowing, cover the seeds with rice straw or grass and take it off when germination is done. Then, make frequently watering to avoid dry soils. For cutting, use the branch of the previous year in March to April or use the relatively hardened new branch in June to July after the flowers fall off. Cut the branch 10 to 13 cm (4-5.2 in) long and soak the cuttings in water

for 1 hour for sufficient water-sucking before planting. The root is seated in about 2 weeks.

Medical Uses

The orange fruits had long been used as a natural pigment to color food and fabric. In oriental medicine, the fruits, called Chija and the roots, called Chi-jahwageun, have been used for reducing fever, strengthening the gall bladder, stopping bleeding, and anti-inflammation.

According to "Grand Dictionary of Chinese Medicines," "Chija has a bitter taste and cold properties. It is effective for reducing fever, calming down rage and decreasing fever in the blood. Chija treats fever, feeling something pressing on the chest without organic changes, insomnia, jaundice, gonorrhea, diabetes, conjunctivitis, hematemesis, nasal bleeding, bloody diarrhea, hematuria, rash caused by fever, abscess and pains by sprain.

The common gardenia contains flavonoids; gardenin, pectin, tannin, crocin, crocetin, d-mannitol, nonacosane and β-sitosterol. In addition, several kinds of iridoide-framed glycosides, that is, gardenoside, geniposide, genipin-1-β-d-gentiobioside and a small amount of shanzhiside are also contained, as well as gardoside, scandoside methyl ester, choline and ursolic acid."

The common gardenia clearly improves secretion of bile, reduces and tranquilizes blood pressure. In addition, its antibacterial effects constrain activities of various micro-organisms. According to the data by Jennam Agricultural Research & Extension Services, the common gardenia shows clear anti-insect and exterminating effects on mites, including two-spotted spider mites and two-spotted spider mites.

In organic agriculture, such effects can be used for a natural pesticide. Decoct the common gardenia fruits or roots with water or infuse them in alcohol for use.

Common Fig and Japanese Fig

Fig is an alkali fruit containing a lot of protein and fiber, edible fresh, canned or dried. The plant is used in treatment of constipation. The latex of figs is used in the treatment of hemorrhoid and anthelmintic.

Common fig (Ficus carica L.) is a deciduous broad-leaf shrub in the family Moraceae, native to western Asia and the Mediterranean regions. As the common fig is intolerant to cold climates, it is mainly cultivated in the area below South Chungcheong province in Korea. It grows to 2 to 4 m (7-14 ft) tall. The leaves are alternate, palm-shaped, broad and 3 to 5-lobed deeply. The lobes have blunt tip, serrated margins and 5 veins. The surface of the leaves is rough and the underside is covered in hairs. When injured, the leaves exude white milk-like latex.

From spring to summer, a pot-shaped flower sack is borne on the leaf axil and tiny flowers bloom inside the sack. As the flower is not visible outwardly, it is called Moohwagwa (no flower) tree. It is dioecious; the female flowers are borne in the lower area and the male flowers are borne in the upper area. In August to October, the flower sack itself becomes the fruit at maturity. The fruits ripen black purple or yellowish green and grow to 5 to 8 cm (2-3.1 in) long. The figs cultivated in Korea are mostly the species that bear fruit without pollination by bees.

At the seashore of south-western beach in Korea, the Japanese fig (Ficus erecta Thunb.), which can be called a traditional fig, is found. It grows to 2 to 4 m (7-13 ft) tall and the obovoid leaves have acute tips and smooth margins. When injured, the leaves exude white milk-like latex. It is dioecious. The fig-shaped, round flower sack is borne in May to June on the leaf axil and ripens dark purple in September to October.

Cultivation

It is possible to cultivate the plant in temperate regions south of South Chungcheong province. Its preferred habitats are deep, fertile, acidic or neutral soils with pH 6.5 to 7.2. The species cultivated in Korea bear fruits by developing the ovary without pollination; hence no seeds inside. That means propagation is mostly done by cutting.

Collect one-year-old branches in winter and bury them in well-drained sandy soils in shade. In

mid-to-late March when the ground thaws, create a nursery by mixing compost and limestone. Cut the branches 20 cm (8 in) long and prick the cuttings for rooting and sprouting. The Japanese fig is also propagated by cutting in March or in June to July.

Medical Uses

The fig is an alkali fruit containing a lot of protein and fiber; edible fresh, canned or dried. The plant is used to treat constipation. The latex of figs is used in the treatment of hemorrhoid and anthelmintic.

According to "Grand Dictionary of Chinese Medicines," "The fruit contains glucose, fructose, sucrose, and citric acid. A small amount of fumaric acid, succinid acid, malonic acid, pyrolytin, carbonic acid, acetic acid, malic acid, quinic acid, shikimic acid and plant growth hormone (auxin) are also present. The root and the rhizodermis contain psoralen, bergapten and guaiazulene. The leaves contain psoralen, bergapten, β-amyrin and lupeol."

According to "Dictionary of Oriental Medicines," "Collect the mature fruit

in autumn and dry them up. It has a sweet taste and tranquil properties. It acts on lung, spleen, and large intestine meridians. It strengthens the stomach, eliminates fever from intestine, reduces edema and neutralizes poisons.

In pharmacological tests, it was revealed that the common fig lowers blood pressure, has anti-cancer effects, improves digestion, and causes light diarrhea. It is used in the treatment of loss of appetite, poor digestion, shigellosis, constipation, gastroenteritis, hemorrhoid, furuncles, and scabies. Take 30 to 60 g a day as a decoction or ingest 1 to 2 fresh figs at once. For external uses, rinse the affected area with the decoction or apply the powdered figs mixed with the base to the affected area."

The milk-like latex of the figs has anthelmintic effects for exterminating roundworms and flagellates. The Japanese fig also has similar effect as the common fig.

In organic agriculture, anti-insect effects of the common fig and the Japanese fig can be used for a natural pesticide. Decoct the leaves or stems with water or infuse them in alcohol for use.

Japanese Rush

A pleasant scent comes from the leaves and roots. The essential oil generating such fragrance tranquilizes mind, stops pains, and improves memory. It is used as a pain killer, tranquilizer, and stomachic. Adding the essential oil into bath water can treat feeling of cold or itchy skin.

Japanese Rush (Acorus gramineus Sol.) is an evergreen perennial plant in the family Acoraceae, mostly growing between the rocks around the valley in the southern regions. The rhizomes trail sideward and the fibrous roots come out from the nodes. The roots in the ground have long, yellow brown nodes but the roots over the ground have short, green notes. The leaves are borne in group from the rhizomes and grow to 30 to 50 cm (12-20 in) long. The leaves have no vein in the middle, are linear and with the acute tips.

The pale yellow flowers, 10 to 30 cm (4-12 in) long, are arranged in spike at

the end of the triangular-sided flower stalk in June to July. The inflorescence, 5 to 12 cm (2-4.8 in) long, is cylindrical and narrowed down to the tip. It is monoecious; there are 6 petals and stamens, respectively and 1 pistil. The fruit is a capsule and the seed is elliptical and the underside is densely covered in hairs.

Similar species include the sweet flag (Acorus calamus L.), commonly found in wetlands around the lake or pond. The sweet flag has a clear vein in the middle of the leaf, and the inflorescence is about 5 cm (2 in) long, as thick as a pinkie and with a blunt tip.

Cultivation

It grows well in highly moist areas in shade. Its preferred habitats are humus-rich clay loamy soils with good water retaining effects. Propagation is made by rhizomes. In mid-April to mid-May, cut the branch rhizomes 5 to 10 cm (2-4 in) long one by one from the 2 to 3-year-old well-grown rhizomes and plant them horizontally.

Avoid the damages of the root when transplanting and avoid exposure of

the root on the ground surface after transplanting for rapid rooting. Plant the root 3 to 5 cm (1.2-2 in) deep while avoiding the leaves buried into the ground. Shade the sun when cultivating the plant in the open field for sound growing. 2 to 3 years after the permanent planting, harvesting is available from late autumn to the next spring before germination.

Medical Uses

A pleasant scent comes from the leaves and roots. The essential oil generating such fragrance tranquilizes mind, stops pains, and improves memory. It is used as a pain killer, tranquilizer, and stomachic. In folk remedy, adding the essential oil into bath water can treat feeling of cold or itchy skin.

According to "Donguibogam (Eastern Medical Manual)," the Japanese rush is described as following: "It has warm (or tranquil) properties and very pungent taste without toxicity. It opens the cardiac space, protects the five viscera, facilitates energy circulation in the nine openings of the body, brightens eyes and ears, improves voice, treats dull senses caused by wind and moist and exterminates parasites from the body. It also eliminates mites and flee, treats forgetfulness, improves wisdom, and relieves pains under the anticardium."

According to "Constituents and Medical Uses of Herbs," "The rhizomes contain 0.5 to 0.9% of the essential oil and the fresh leaves contain 0.25%. 63 to 81% of the essential oil are β-asarone. α-asarone (8 to 14%), caryophellene (1 to 4%), cekison C12 H16 O3 (0.8 to 3.4%), safrole C10 H10 O2 (0.1 to 1.2%), cis-methylisoeugenol (0.3 to 6.8%), α-humulene (0.8 to 2%),

calamenene (0.1 to 0.2%) and camphor (0.1 to 0.2%) are also present (the construct of the essential oil in the rhizomes and the leaves is the same). In addition, palmitic acid, phenolic compounds and trace elements are also included. In oriental medicine, Japanese rush is used as a tranquilizer, pain killer and a gastrointestinal agent in the treatment of confused mind, ringing in the ears, headaches, rheumatoid arthritis, gastritis, duodenal ulcer, dyspepsia, chronic bronchitis and bulging chest and abdomen pains. In addition, rinse the affected area in case of scabies with the Japanese rush decoction. Bathe with the Japanese rush extract to relieve abdominal or waist pains caused by feeling of cold."

Take 4 to 8 g, or 12 to 30 g a day in case of the fresh plant, as a decoction, pill or powder. For external uses, rinse the affected area with the decoction or apply the powder mixed with the base to the affected area.

The Japanese rush does not suffer from diseases or pests. White grubs do not eat the root, which indicates that the Japanese rush has such a strong insect-repellant and insecticidal effects. In organic agriculture, such anti-insect effects of the Japanese rush can be used for a natural pesticide. Extract juice from the whole plant including rhizomes, decoct it with water or infuse it in alcohol.

Japanese Chaff Flower (Wooseul)

The fresh sprout is edible as a vegetable dish in spring. The stem or root is used for tea or liquor. The steamed and dried root protects the liver and the kidney, strengthening muscles and skeleton, and it is mainly used in the treatment of arthritis and neuralgia.

Japanese chaff flower (Achyranthes japonica) is a perennial plant in the family Amaranthaceae, commonly found at roadsides and growing well in a little bit wet areas. It grows to 50 to 100 cm (20-40 in) tall. The stems are square-shaped, hardened and split into several twigs. The stem nodes are elliptical and rounded like the cow's knees. Some of them become a gall protruding clearly. The leaves are arranged in opposite pairs, elliptical or obovate and have smooth margin.

In August to September, the pale green flowers are borne at the end of the

stem or on the leaf axil in long spike. The flowers bloom from bottom to top and droop downward once the flowers fall off. There are 5 perianth pieces, 5 stamens, 1 pistil and 3 bracts. The filaments are joined together at the bottom and a bump comes up between each filament. The fruits are long elliptical utricles and have the hook-shaped bracts, making them easy to attach to clothes or animal hairs.

Cultivation

It is a commonly found weed and grows well anywhere but deep, humus-rich soil are suitable for cultivation. Propagation is made by seeds. In autumn, cut and dry the head before the matured seeds fall off and collect the seeds. Suitable time for sowing is early April in the southern regions and early May in the central regions. Drill planting in the distance of 20 to 50 cm (8-20 in) or scattering is recommended.

In July to August, the branches and leaves are thickened and the flower stalks are produced. If you don't plan to collect the seeds, cut the branches in

the mid July leaving about 30 cm (12 in) for the first phase and make the second phase cutting in the mid-to-late August. This will help the plant stand erect and have better root growth.

Medical Uses

The fresh sprout is edible as a vegetable dish in spring. The stem or root is used for tea or liquor. The yellow brown root consists of thin cylindrical main root or the main root with the attached lateral roots. The root growing in the southern regions is thicker and healthier. The dried root, called "Wooseul," is used for medicinal purposes.

The dried raw root is effective for eliminating extravasated blood and furuncles, and is used in the treatment of menstrual irregularity and pain after giving birth. The steamed and dried root protects the liver and the kidney, strengthening muscles and skeleton, and it is mainly used in the treatment of arthritis and neuralgia.

According to "Constituents and Medical Uses of Herbs," "The root contains triterpenoid saponin divided into oleanolic acid and glucuronic acid by hydrolysis. It also contains akirantin (soluble alkaloid) and other alkaloids, a large amount of mucus and potassium salts. Insect metamorphosis hormones, such as Ecdysterone and Inokosterone, are also found in the root. In addition, amino acids, such as itosterol, stigmasterol and asparaginic acid, and polybasic acids, such as succinic acid, are present."

According to "Donguibogam (Eastern Medical Manual)," Wooseul is described as following: "It has tranquil properties and a bitter sour taste without toxicity. It is usually used to treat difficulties in bending knees caused by muscular dystrophy and blocked meridian system, impotence, diabetes of men, and difficulties in holding urination for the senior. It supplements the bone marrow and facilitates yin energy, thereby preventing gray hairs and treating impotence and waist back pains. It causes abortion and facilitates menstruation. It helps 12 meridians, enhancing blood circulation and creating blood. It brings all the effect of the medicine into the waist and thigh. Rinse it in alcohol for use."

When an insect consumes a large amount of this plant, insect metamorphosis hormones contained in Wooseul will inhibit normal growth of the insect. According to research, Wooseul is known to have anti-insect effects on two-spotted spider mites.

In organic agriculture, such effects of the Japanese chaff flower can be used as a natural pesticide. Extract juice from the root, as well as the whole plant, decoct it with water or infuse it in alcohol for use.

Japanese Pagoda Tree

In oriental medicine, the flower bud of the Japanese pagoda tree is called "Goihwa," and their fruit is called "Goishil" or "Goigak," and they are all used for medicinal purposes. It is effective for stopping various kinds of bleeding caused by fever in blood, cooling down fever in blood, treating red eyes, headaches and dizziness caused by fever in the liver, and curing skin diseases.

Japanese pagoda tree (Sophora japonica L.) is a deciduous tall tree that belongs to the genus Styphnolobium in the family Leguminosae, found in Korea, China and Japan. It grows to 25 m (80 ft) tall. The bark is dark gray-brown and furrowed vertically. The young branch is green and covered in white hairs and lenticels. When injured, the plant extrudes a smell. The leaves are alternate and odd- pinnate. The leaflets are ovoid or ovoid-elliptical and with smooth margins. There are 7 to 17 leaflets.

In July to August, yellow flowers are borne in panicle at the end of the new branches. The calyx tube is bell-shaped and covered in short hairs. The fruit is a legume, ripens yellow in September to October and droops downward at maturity. The pod is 5 to 8 cm (2-3.1 in) long, fleshy and has the rosary-shaped surface. 1 to 4 brown seeds are usually included in a pod.

Cultivation

Cultivation is possible in all parts of the country. Japanese pagoda tree does not have a prefer-

ence in soils and it also grows well in barren lands. It is recommended cultivating the Japanese pagoda tree in sunny areas. Propagation is made by seeding, cutting, and grafting. As it is easily germinated, propagation is mainly made by seeds. For cutting, cut and prick the branch of the previous year in early spring.

For seeding, collect the matured seeds in autumn and store them in the open field and sow them in the next spring. Avoid dryness of the seeds. Soak the seeds for 24 hours in warm water in temperature of 40 to 50°C (104-122°F) for easy germination. Germination is relatively late and the spouts appear from late spring to early summer. After germination, shed enough sunlight. The Japanese pagoda tree grows rapidly and it starts blooming in 6 to 7 years.

Medical Uses

Japanese pagoda tree, called "Hakjasu," has long been planted as a gardening plant. In oriental medicine, the flower bud of the Japanese pagoda tree is called "Goihwa," and their fruit is called "Goishil" or "Goigak," and they are all used for medicinal purposes. It is effective for stopping various kinds of bleeding caused by fever in blood, cooling down fever in blood, treating red eyes, headaches and dizziness caused by fever in the liver, and curing skin diseases.

According to "Donguibogam (Eastern Medical Manual)," the fruits and flowers of the Japanese pagoda tree are described as following: "Goishil has cold properties and a bitter, sour and salty taste without toxicity. It is mainly used in the treatment of 5 kinds of hemorrhoid and burns. It reduces high fever and promotes smooth delivery. It causes abortion, kills parasites and treats a stroke.

It treats wet feeling and itchiness in reproductive organs and bleeding before bowel movement, and promotes smooth delivery.

Goihwa treats 5 kinds of hemorrhoid and heartburn, exterminates parasites in the body, treats bleeding before bowel movement and white/red shigellosis, and reduces fever in the large intestine. Slightly rinse it before use."

According to "Constituents and Medical Uses of Herbs," "The flower buds contain 10 to 28% of rutin, a small amount of kaempferol, quercetin, sophorosid, and genistein glycosides. The rutin content in the flower is highest in the flower bud, and it drops considerably once the flower blooms. When the flower falls off, up to 40% of rutin is contained in the fruit. The fruit contains rutin, quercetin, genistein, sophoricoside, sophorabioside, as well as other flavonoids and anisole, a phenol compound. The entire plant contains alkaloid and the seeds have 0.35% of alkaloid. The alkaloid contained includes cytidine, N-methylcytidine, sophocarpine, and matrine."

Rutin is one of flavonol glycosides and is effective for preventing cerebral hemorrhage, radiation hazard and bleeding disorders. Quercetin is a yellow flavonoid widely found in nature, followed by chlorophyll, carotin, and xanthophyll, and it is mostly used for antioxidant in food. In test, rutin and quercetin suppressed virus, staphylococcus, and colon bacterium.

In organic agriculture, such anti-insect and antibacterial effects of the Japanese pagoda tree can be used for a natural pesticide. Extract juice from the fruits and flowers, decoct them with water or infuse them in alcohol for use.

Firethorn

The fruit of firethorn, also called "Jeokyangja" or "Chakyeophwageuk," is used for medicinal purposes. With peptic effects, it enhances digestion and treats gastritis. It is also effective for treating diarrhea and shigellosis.

Firethorn (Pyracantha) is an evergreen shrub in the family Rosaceae, native to southeast Europe and Asia. There are 6 species. The firethorn usually grows to 4 to 6 m (13-20 ft). The fruits are beautiful and various species are grown for ornamental purposes. In Korea, some of the popular varieties include Pyracantha angustifolia, native to Southwest of China, Pyracantha coccinea, native to Southern Europe and West Asia, and Pyracantha crenulata, native to Himalayas.

The leaves of Pyracantha angustifolia are alternate, long elliptical and with almost smooth margins. White flowers bloom in May to June in a corymb.

Round fruits ripen in orange yellow in September to October and the calyx remains. It is an evergreen plant but the leaves fall off in central-to-northern regions. The leaf of Pyracantha coccinea is obovate and has fine serrates on the margin. The fruits ripen in orange. The leaf of Pyracantha crenulata is rounded or reverse-lanceolate and has serrates. The fruits ripen in red.

Cultivation

Firethorn likes sunlight and moisture and does not have a special preference to soil quality. When cultivated in shade, the branch is coarse and the tree hardly ever bears fruits. Lack of moisture makes the leaves turn yellow and the fruits wrinkled. Propagation is made by seeding and cutting.

For seeding, collect the matured seeds in autumn and remove the flesh and sow them immediately. Or store them in the open field or at low temperature of 3 to 5 °C (37.4-41°F) and sow them in the next spring. The fruits are borne 3 to 5 years later. For cutting, use the branch of the previous year or the new branch in March, May or June to September. Cut the branches 15 cm (6 in)

long and take the leaves except for a few upper leaves and soak them in water before pricking.

Medical Uses

The fruit is mainly used for ornamental purposes. The fruit of firethorn, also called "Jeokyangja" or "Chakyeophwageuk," is used for medicinal purposes. Collect the fruits in October to December and dry them up. It is effective for treating shigellosis, bleeding before bowel movement (bleeding in hemorrhoid), malignant furuncles and emaciation. Take 9 to 15 g a day as a decoction.

According to "Illustrated Book of Korean Medicinal Herb" written by Deok-gyun An, Jeokyangja is described as following: "It has a sweet sour taste and tranquil properties. It is effective for strengthening the spleen and eliminating internal lump, and facilitating blood circulation and stopping bleeding. With peptic effects, it enhances digestion and treats gastritis. It is also effective for treating diarrhea and shigellosis. It stops vaginal bleeding, eliminates extravasated blood after delivery and alleviates pains."

The fruits and leaves of the firethorn contain toxic components and irritant substances such as hydrogen cyanide (HCN), maytansine, chloroform, acetic ether, and petroleum ether. In addition, flavonoid, luteolin and proanthocyanidin including luteolin-3', 7-diglucoside, apigenin, apigenin-7-O-glucoside and rutin, are also in it.

HCN, a well-known poison, helps digestion, improves respiration and is effective for treating cancer, such as leukemia. However, a large amount of ingestion may cause vomiting, abdominal pains, soft tongue, and diarrhea, and in the worst case it may lead to death. Maytansine is a substance that prevents protein synthesis including DNA and RNA, and has an adverse side effect of generating toxicity in the stomach and the nerve in anticancer treatments.

According to research conducted by the Jeonnam Agricultural Research & Extension Services, the firethorn extract is effective for exterminating two-spotted spider mites. In organic agriculture, such toxicity of the firethorn can be used as a natural pesticide. Extract juice from the fruits or the leaves, decoct them with water or infuse them in alcohol for use.

Chinese Catalpa (Nonamu)

The root and bark has a bitter taste and cold properties. It is effective for reducing fever, neutralizing poisons, and exterminating insects. It is used in the treatment of epidemic fever, jaundice, vomiting, pruritus, and scabies.

Chinese catalpa (Catalpa ovata G.Don) is a tall tree that belongs to the genus Catalpa in the family Bignoniaceae, growing to 6 to 10 m (20-33 ft) and native to China. Although it is classified differently, the leave or flowers of the Chinese catalpa look similar to those of the royal foxglove tree (Odong tree); hence the name Gaeodong (meaning false odong tree) in Korean. The bark is reddish brown and vertically furrowed.

The leaves are arranged in opposite pairs or spirally, broad-round shape and 3 to 5-lobated on the margin. The underside of the leaf is pale green and the

vein is covered in fine hairs. The petiole is purple.

Yellowish white flowers are borne in panicle at the end of the stalk in June to July. The flowers are hairless and the calyx splits into two sections. The lipped petal has 2 yellow lines and purple spots. There are 2 complete stamens and 3 stamens with atrophied anthers. Fruits are produced in October. It is a capsule, 20 to 30 cm (8-12 in) long and drooping long and thin like a string; hence the name Nokeunnamu or Nonamu in Korea ('no' or 'nokeun' meaning string).

Cultivation

Cultivation is possible in all parts of the country. The Chinese catalpa prefers moist soils in full sun and grows relatively fast. Propagation is made by seeding or cutting.

For seeding, collect the seed in autumn and sow them immediately or store them at low temperature and sow them in the next spring. Germination is easy. For cutting, use the root or young branch. Cut the root in winter and young

branch in late spring or summer before the leaves are matured. Cut those 10 cm (4 in) long and prick them.

Medical Uses

The Chinese catalpa is called "Jamok" and their roots, barks and fruits are used for medicinal purposes. Dig out the rhizodermis in spring and summer. Rinse off soil and sand in water and peel off the skin. Dry up the rhizodermis in sun. The fruits are harvested from autumn to winter.

According to "Grand Dictionary of Chinese Medicines," "The rhizodermis contains isoferulic acid, sitosterol, and phydroxybenzoic acid; the bark contain p-coumaric acid and ferulic acid. The fruits contains catalposide, des-p-hydroxy benzoylcatalposide, p-hydroxybenzoic acid, citric acid, and lead, and the seed contains p-hydroxybenzoic acid, β-sitosterol, and fatty acid.

The root and bark has a bitter taste and cold properties. It is effective for re-

ducing fever, neutralizing poisons and exterminating insects. It is used in the treatment of epidemic fever, jaundice, vomiting, pruritus, and scabies. The fruit has a sweet taste and tranquil properties without toxicity. It increases urination and treats edema, chronic nephritis, and proteinuria. When used for external purposes, it kills parasites."

The leaf and fruit extract has strong growth suppressant effects on various microorganism including staphylococcus aureus, colon bacterium, aerogenex bacillus and gram-positive bacterium, gram-negative bacterium, yeast and fungi. In organic agriculture, such anti-insect and antibacterial effects of the Chinese catalpa can be used for a natural pesticide. Extract juice from the barks, leaves and fruits, decoct them with water or infuse them in alcohol for use.

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